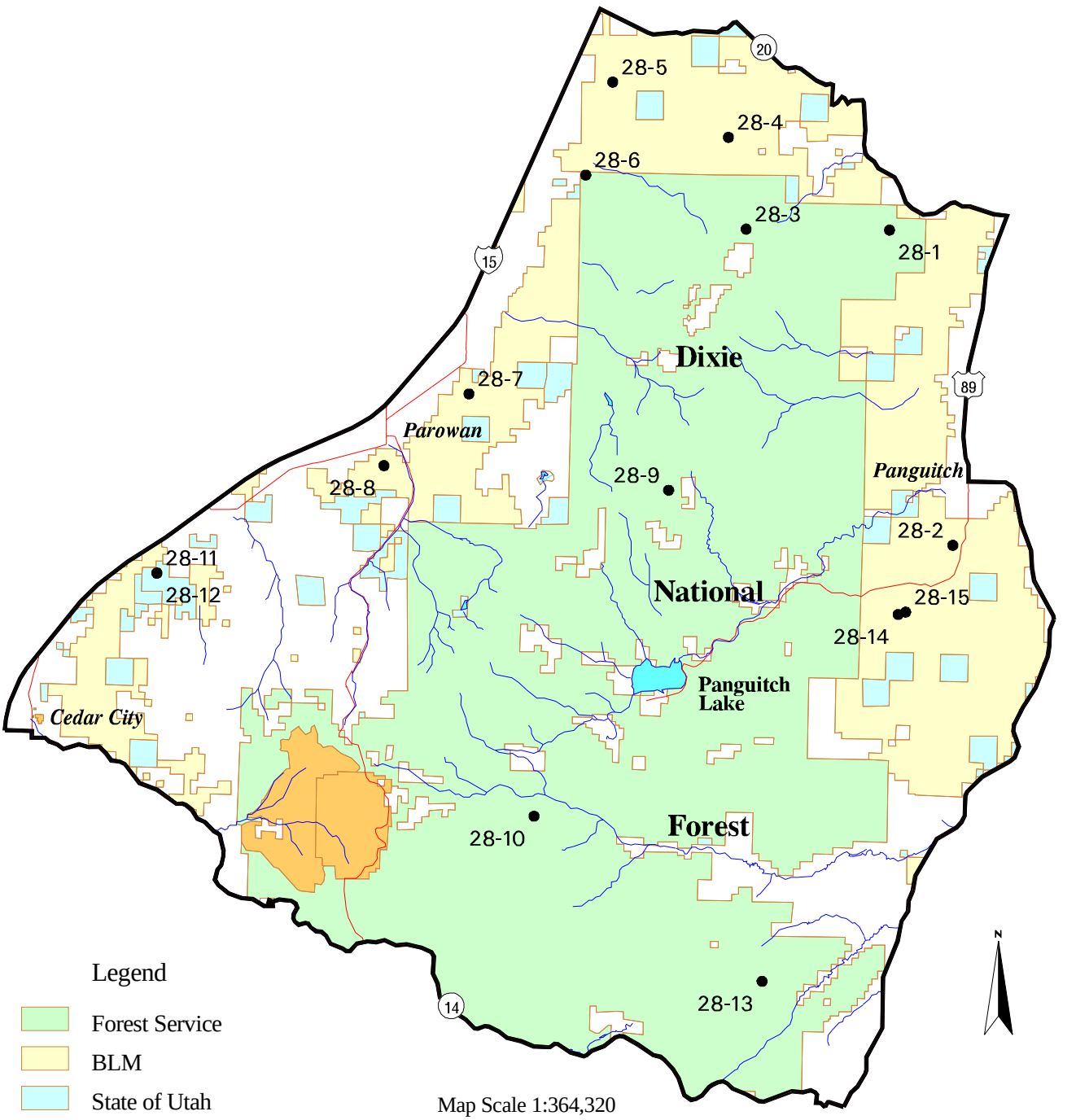
Management Unit 28

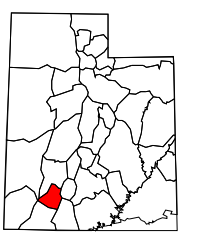


Legend

- Forest Service
- BLM
- State of Utah
- Private Land
- Wild. Area/Nat. Monument
- Water Body
- Transect Location
- Road
- Perennial Stream

Map Scale 1:364,320
(1" = 5.75 miles)

Unit Location



UDAF GIS May, 2000

MANAGEMENT UNIT 28 (47) - PANGUITCH LAKE

Boundary Description

Garfield, Iron and Kane counties - Boundary begins at Highway SR-14 and Highway US-89; then north on US-89 to Highway SR-20; then west on SR-20 to Interstate 15; then south on I-15 to Highway SR-14; then east on SR-14 to US-89 and beginning point.

Winter Range Description

Most or all of Herd units 57 A, B, C, & D were combined and renamed deer herd unit 47 in 1993. Guinta (1982) presents a complete description of the summer and winter range on herd unit 57A and 57B. These subunits were combined in 1979 to better reflect the contributions made by both the northern and southern portions to the seasonal requirements of the deer herd. The winter range on the eastern portion of the unit is higher in elevation and experiences colder temperatures than on the Parowan side; and consequently, far fewer deer winter on the Panguitch side. The key areas that were identified on the winter range on the eastern side of the unit are: pinyon-juniper woodlands south of Panguitch, seeded range at the north end of Upper Bear Valley, the mixed brush type in Buckskin Valley, and the pinyon-juniper chainings in Three Creeks drainage. These study sites range in elevation from 7,100 to 7,600 feet and represent key areas within the limits of normal winter range on the east side. The only severe winter range available on the unit is located on the pinyon-juniper slopes below the Hurricane Cliffs and on the sagebrush flats that extend from the slopes to I-15. During severe winters the deer on this herd unit are packed into the narrow area between the cliffs and the interstate. Habitat availability is effectively reduced by 80% during these severe winters. The key areas that were identified by the local interagency committee for this area include; the Wyoming big sagebrush type west of Swayback Knoll, a Wyoming big sagebrush type in the mouth of Cottonwood Creek, a pinyon-juniper chaining east of Paragonah, a big sagebrush/ pinyon-juniper ecotone in Grass Valley south of Parowan, and a mountain big sagebrush/pinyon-juniper ecotone in Elliker Basin. The importance of each of these areas for deer has increased over the years as sagebrush flats have been converted to sprinkler irrigated agricultural lands; mainly from Highway U-20 to Parowan. Due to depredation problems, deer fences are being constructed around many of these fields. In addition, the deer-proof fence along I-15 from summit to Cedar City severely limits the winter range available to deer on the west side of the freeway. Urbanization of former winter range is continuing, especially in the Fiddler's Canyon area north of Cedar City. Of particular concern is the fact that 41% of the severe winter range, from U-20 to Cedar City, is privately owned. Additional habitat losses are to be expected on these privately owned parcels of land.

Summer range is not considered a limiting factor for this deer herd. Summer range on the northern portion of the unit generally lies between 8,000 and 9,000 feet and consists largely of gentle rolling terrain. Key summer range areas that were identified in this unit were also classified as transition range (Buckskin Valley and Upper Bear Valley). Studies were established in the Mammoth Creek drainage and in the Little Valley area. Two more studies were established in 1998 on the Sheep Hollow area near Panguitch (Sheep Hollow West and Sheep Hollow East).

Livestock Grazing on Key Areas

Eastern Portion - Normal Winter Deer Range

The Three Creeks study site is located in the USFS Three Creeks Cattle Allotment. A rest-rotation grazing system is used to manage livestock on this unit. The allotment is grazed from 6/1 to 10/15, with use on the study site occurring during the spring. The Upper Bear Valley site is located within the USFS Red Creek Cattle Allotment. This area was grazed by sheep and cattle prior to 1940. Since then, cattle have used the area exclusively. A deferred-rotation grazing system is used to manage livestock on the allotment. The season of use is from 6/16 to 10/15. The Buckskin Valley site is located in the BLM administered Buckskin

Mountain Allotment. The unit is grazed annually during the late spring by sheep and cattle. No grazing system is in use. The active preference for livestock has been set at 582 AUMs.

Western Portion - Severe Winter Deer Range

The Swayback Knoll site lies within the BLM, Bone Hollow Cattle Allotment. Recently, a three-pasture rotation system has been implemented on this unit. This is one of the few allotments in the area that permits winter grazing on crucial deer winter range. The Paragonah study site is in an unallotted area of BLM land. Use by cattle does occur since forage production has been enhanced by an old chaining and seeding project. No monitoring of livestock use is carried out by BLM on this area. The Cottonwood site is located in the same allotment as the Upper Bear Valley site. This site is located in a unit that is grazed during the spring in most years.

The Grass Valley study is located in the P-Hill Allotment and is used by cattle from spring to mid-summer. The allotment is used season-long on an annual basis with no provision for deferred or rested pastures. The Elliker Basin study is located on DWR land which was acquired by way of a trade from the BLM. Spring grazing by cattle will probably continue in order to promote shrub production.

High Elevation - Summer Range

The summer range sites, Red Desert and Little Valleys, are located in the Red Desert and Little Valleys Cattle Allotments. Both areas were grazed by sheep and cattle prior to 1939. Sheep use continued until 1947 in the Red Desert and until 1973 in Little Valleys. Cattle are managed on a deferred-rotation system in both allotments. The season of use runs from 7/6 to 9/20 on the Red Desert Allotment and from 6/1 to 10/15 in Little Valleys allotment. Suitable range appears to be twice as productive on the Little Valleys Allotment (5 acres/AUM) than on the Red Desert Allotment (11 acres/AUM). Asay Knoll, a new study site, occurs on the large Uinta Flat burn. It is located within the Buck Knoll pasture of the Asay Knoll Grazing Allotment. Currently 266 cattle use the area for about one month beginning on June 16th. They are then moved to another pasture.

Many of the herd unit allotments received drought reductions of 10% to 15% during the summer of 1990.

Herd Unit Management Objectives

The objective for this unit is to maintain a harvest of 1,500 buck deer annually. To achieve this level of harvest it will be necessary to maintain the amount of acreage providing severe winter deer range habitat on the west side of the unit (approximately 44,500 acres). As winter range habitat is lost to other land uses on private land, it will be necessary to increase the carrying capacity of key areas on public lands.

The Panguitch Lake deer herd was at or near carrying capacity at the time of the 1987 reading. Antlerless harvest averaged 466 does/yr between 1984 and 1987. Buck harvest exceeded the objective of 1,500 that was identified in the herd unit management plan during the 1987 and 1989 hunts. Buck harvests steadily increased from a low of about 600 in 1975 to a high of 1,935 in 1987 (Jense 1993). However, harvests have declined since that time. During the 1992 hunt only 604 bucks were harvested. Data from pellet group transects also show a declining number of deer days use/ha since 1987. Fawn doe ratios have actually increased from 64 fawns per 100 does in 1987 to 73 by 1992. The overall average since 1987 is considered low at 69 fawns per 100 does.

Trend Study 28-1-98

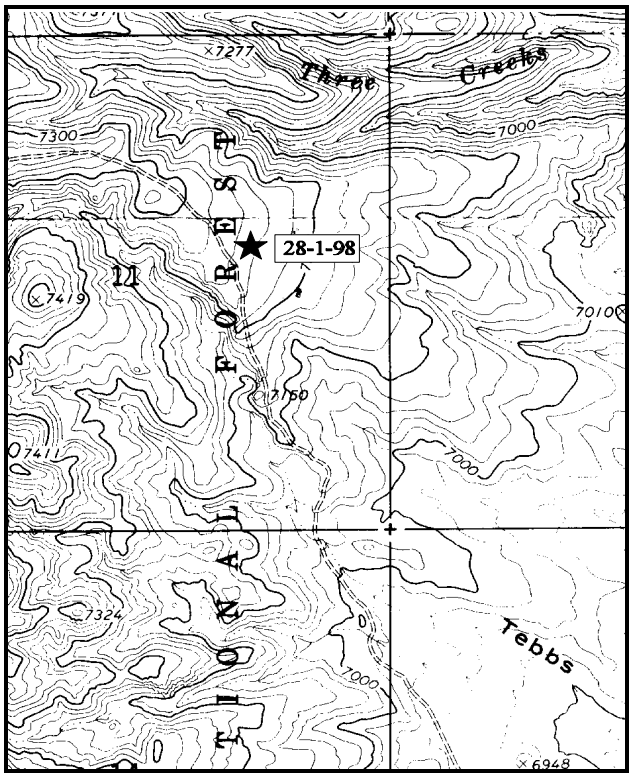
Study site name: Three Creeks . Range type: Chained, Seeded Pinyon-Juniper.

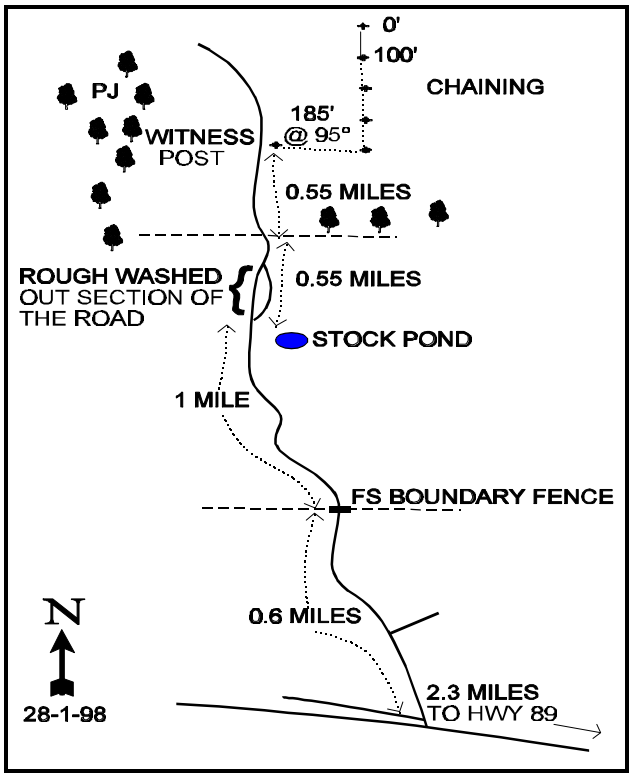
Compass bearing: frequency baseline 167 M degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the SR20-US89 junction, proceed south on 89 for 3.1 miles to the Three Creeks road. Travel west on this road (do not take north fork by gate) for 0.5 miles to a fork. Bear right and go 1.85 miles to three forks taking the rightmost one. Travel 0.6 miles to a cattleguard. Continue 1.0 mile to a stockpond. Proceed up the washed out road for 0.55 miles to a fence taking a right fork at 0.3 miles. Continue 0.55 miles up to the chaining and to the witness post which is a short yellow fencepost. From the witness post by the road, walk 185 feet east to the 400-foot stake. The 0-foot baseline stake is 400 feet north, and the short green fencepost is tagged #7164.





Map Name: Panguitch NW . Diagrammatic Sketch

Township 33 S , Range 6W , Section 11 UTM 4201855.995 N, 369050.510 E

DISCUSSION

Trend Study No. 28-1 (47-1)

The Three Creeks trend study is found on the northeast edge of the Markagunt Plateau. The site is at an elevation of 7,200 feet with a gentle 8% to 10% slope which drains easterly into the Sevier River. Numerous intermittent streams are nearby with a stock pond one mile to the south. The area is utilized by deer in light winters, by an expanding elk herd, and grazed in the summer by cattle. The study area was chained and seeded in 1967. Now it is a sagebrush-grass type with some scattered pinyon and juniper trees, which are increasing in size. A follow up treatment on these trees was done with chainsaws between 1987 and 1992.

The soil is tightly compacted with a high percentage of coarse fragments throughout the soil profile. Soil textural analysis indicates a sandy loam with a neutral pH (7.1). Both phosphorus and potassium could be limiting to vegetative growth and development with values of 7.3 ppm for phosphorus and 28.8 ppm for potassium. Values of 10 ppm and 70 ppm respectively are thought to be minimal for normal plant development. During the 1987 reading, it was observed that the road and washes nearby showed signs of severe gully erosion and signs of minor sheet erosion on the study site. At that time, soil movement was detectable and some grasses were pedestaled. During the 1992 and 1998 surveys, no active gully erosion was observed and recent soil movement was not detected. Both percent vegetation and litter cover has increased since 1992, while percent bare ground and rock-pavement cover have declined.

Mountain big sagebrush is the dominant shrub species. Hybridization is occurring which makes identification difficult. In 1987, most of the sagebrush was classified as basin big sagebrush (Artemisia tridentata tridentata). During the 1992 survey, the majority of the sagebrush was determined to be mountain big sagebrush (A. t. vaseyana). The mountain big sagebrush density estimate for 1987 was 33 plants/acre. The density increased in 1992 to 1,760 plants/acre, then declined in 1998 to 1,340 plants/acre. The large increase from 1987 to 1992 was more reflective of the increased sampling size and improved sampling design, not actual increases in the population. In 1987 and 1992, utilization was moderate with a few individual plants displaying heavy hedging. In 1998, utilization is mostly light. Currently, these plants average 22 inches in height with a crown of 30 inches. Vigor is good over all years and percent decadency continues to be low. The basin big sagebrush density has changed very little since the change in sampling design in 1992, with an estimated density of 120 plants/acre in 1998.

Another important browse species on the site is a few scattered bitterbrush plants. In 1987, the estimated density for antelope bitterbrush was 66 plants/acre. These plants were all classified as mature and were heavily hedged. In 1992, the population density was nearly the same with an estimated 60 plants/acre. These plants exhibited less utilization with 33% heavily hedged and 67% lightly hedged. Antelope bitterbrush density increased slightly in 1998 to 100 plants/acre. Moderate utilization was evident and only one young plant was encountered. The small invader subshrub broom snakeweed was the most abundant shrub with 5,133 plants/acre in 1987 and 4,300 in 1992. Currently, the estimated density has greatly declined to an estimated 900 plants/acre. This great decline in density is likely due to extended drought as this species fluctuates greatly with annual precipitation patterns.

Point-centered quarter data from 1992 estimated 53 pinyon pine trees/acre and 43 Utah juniper trees/acre. Fifty five percent of the junipers sampled were tipped trees that were still growing. These were taken out during the follow up chainsaw treatment. In 1998, the point-centered quarter data estimated 42 Utah juniper trees/acre and 59 pinyon pine trees/acre. Five percent of the Utah juniper trees and none of the pinyon pine trees sampled were tipped. Most of the trees are currently in the four to eight foot size class with many young plants encountered. Photographs from all years show a great increase in size of the trees as well.

The herbaceous understory is dominated by the seeded grasses, crested wheatgrass and intermediate wheatgrass, both of which were moderately utilized during the summer of 1998. Crested wheatgrass had a nested frequency value of 288 in 1987 which significantly decreased to 216 in 1992. The sum of nested

frequency then significantly increased to 281 in 1998, a value similar to that initially recorded in 1987. Conversely, intermediate wheatgrass had a nested frequency value of 45 in 1987 which significantly increased to 143 in 1992. In 1998, the nested frequency value significantly decreased to 60. Crested wheatgrass currently accounts for 84% of the grass cover and 74% of the herbaceous understory. Indian ricegrass nested frequency has significantly decreased since 1992, but is still significantly higher then reported in 1987. Other common grasses include blue grama and western wheatgrass. Cheatgrass was encountered in one quadrat and is currently not a factor on this site. Forb diversity continues to be high, but most species are rare. Silvery lupine continues to be the most common forb species.

1987 APPARENT TREND ASSESSMENT

Fourteen percent of the ground cover on the site comes from erosion pavement and a few larger rocks. Vegetative cover is scattered, but litter covers 54% of the soil surface while bare soil has a cover value of 26%. Erosion is evident, yet not a serious problem on the site. Sagebrush is well established on the site and should increase. Seeded grasses are also well established but forbs are deficient.

1992 TREND ASSESSMENT

Visual observations of the site indicate stable soil conditions with no active gullies or recent soil movement. Bare ground, mostly the result of livestock trampling, has increased since the last reading from 26% to 35% in 1992. Trend for soil appears to be stable. The key browse species are basin big sagebrush and mountain big sagebrush. Their combined density increased greatly since 1986, but this was because of the larger sample size which gives much better estimates of browse densities. The age structures for the sagebrush are good with acceptable percentages of decadency. The browse trend is up. Nested and quadrat frequencies of perennial grasses have increased while those of forbs have declined. Overall trend for herbaceous understory is up.

TREND ASSESSMENT
soil - stable
browse - up
herbaceous understory - up for grasses

1998 TREND ASSESSMENT

The soil trend appears to be stable. Percent vegetation and litter cover have increased slightly while percent bare ground and percent rock and pavement cover combined have decreased slightly. Percent bare ground is still quite high and there is still some erosion potential during moderate to intense rain events. The browse trend is stable. The mountain big sagebrush population density has decreased slightly since 1992 with only a few dead plants encountered in 1998. The age structure has changed very little since 1992 with a mostly mature population with a low biotic potential. The bitterbrush population is also stable and exhibits moderate to heavy hedging. Broom snakeweed density has greatly declined since 1992, probably due to annual precipitation patterns. Although the density of pinyon pine and Utah juniper is currently similar to that reported in 1992, the trees have increased in size and will continue to do so to the point it will become more dominate on the site in the future. As these trees increase in size and dominance, the herbaceous understory and browse component will slowly decrease as canopy cover increases. The herbaceous understory trend is stable. Crested wheatgrass dominates the site with a significant increase of nested frequency since 1992. Perennial grass sum of nested frequency has changed little since 1992. Perennial forb sum of nested frequency shows a slight increase, but forbs are currently a minor component of the herbaceous understory.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 1

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Agropyron cristatum	$_{b}$288	$_{a}$216	$_{b}$281	92	81	94	12.81	17.80
G	Agropyron intermedium	$_{a}$45	$_{b}$143	$_{a}$60	17	53	24	4.77	1.26
G	Agropyron smithii	$_{a}$-	$_{b}$39	$_{b}$35	-	18	13	1.27	.66
G	Agropyron spicatum	$_{a}$-	$_{ab}$4	$_{b}$8	-	1	4	.63	.05
G	Bouteloua gracilis	$_{a}$27	$_{b}$53	$_{ab}$51	11	22	21	2.32	.62
G	Bromus tectorum (a)	-	-	2	-	-	1	-	.00
G	Carex spp.	$_{a}$3	$_{ab}$12	$_{b}$22	1	5	8	.27	.31
G	Elymus junceus	-	4	-	-	2	-	.06	-
G	Oryzopsis hymenoides	$_{a}$-	$_{c}$27	$_{b}$12	-	13	5	.63	.06
G	Poa fendleriana	$_{a}$-	$_{ab}$4	$_{b}$13	-	1	6	.03	.06
G	Poa secunda	-	-	4	-	-	2	-	.01
G	Sitanion hystrix	$_{a}$-	$_{ab}$6	$_{b}$14	-	3	7	.33	.10
G	Stipa comata	9	7	6	6	4	3	.24	.22
Total Annual Grasses		0	0	2	0	0	1	0	0
Total Perennial Grasses		372	515	506	127	203	187	23.39	21.17
F	Alyssum alyssoides (a)	-	-	3	-	-	1	-	.00
F	Arabis spp.	$_{b}$11	$_{a}$-	$_{a}$-	5	-	-	-	-
F	Astragalus argophyllus	1	-	-	1	-	-	-	-
F	Astragalus convallarius	-	-	2	-	-	1	-	.03
F	Astragalus spp.	2	1	-	1	1	-	.00	-
F	Castilleja chromosa	-	3	3	-	1	1	.03	.03
F	Cryptantha fulvocanescens	$_{b}$15	$_{ab}$13	$_{a}$5	9	5	2	.07	.04
F	Descurainia spp. (a)	-	$_{b}$16	$_{a}$-	-	7	-	.23	-
F	Draba spp. (a)	-	-	1	-	-	1	-	.00
F	Erigeron pumilus	4	-	-	3	-	-	-	-
F	Ipomopsis aggregata	7	3	-	3	1	-	.00	-
F	Lappula occidentalis (a)	-	-	3	-	-	1	-	.00
F	Lupinus argenteus	46	49	51	19	26	25	2.59	2.61
F	Lygodesmia spinosa	-	2	2	-	1	1	.00	.03
F	Machaeranthera canescens	3	-	4	1	-	2	-	.01
F	Penstemon spp.	11	5	4	5	3	1	.06	.00
F	Phlox longifolia	$_{a}$8	$_{a}$11	$_{b}$39	3	6	19	.08	.17
F	Polygonum douglasii (a)	-	-	3	-	-	3	-	.01
F	Senecio multilobatus	13	4	3	7	2	2	.01	.03
F	Sphaeralcea coccinea	-	6	5	-	3	2	.09	.01
F	Streptanthus cordatus	3	-	-	1	-	-	-	-
F	Tragopogon dubius	-	-	-	-	-	-	-	.00
F	Trifolium spp.	-	-	1	-	-	1	-	.00

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
F	Unknown forb-annual (a)	-	2	-	-	1	-	.03	-
F	Unknown forb-perennial	-	3	6	-	1	3	.00	.01
Total Annual Forbs		0	16	10	0	7	6	0.23	0.01
Total Perennial Forbs		124	102	125	58	51	60	2.99	3.02

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 1

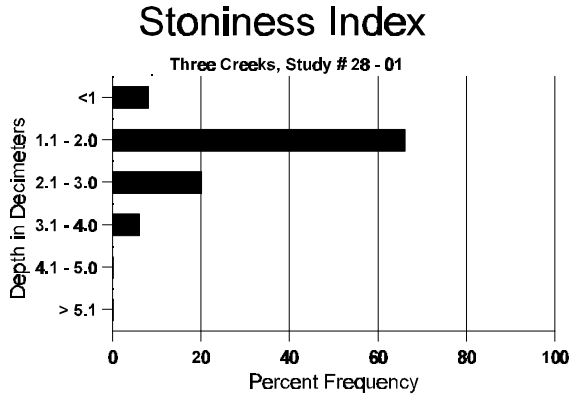
Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Artemisia nova	1	1	-	.00
B	Artemisia tridentata tridentata	5	5	2.77	1.29
B	Artemisia tridentata vaseyana	33	45	4.02	6.34
B	Chrysothamnus viscidiflorus viscidiflorus	1	1	-	.00
B	Gutierrezia sarothrae	53	24	.51	.42
B	Juniperus osteosperma	6	4	1.13	.84
B	Leptodactylon pungens	0	0	-	-
B	Opuntia spp.	12	5	.33	.06
B	Pinus edulis	5	6	.15	.18
B	Purshia tridentata	2	5	.18	.68
Total for Browse		118	96	9.11	9.83

BASIC COVER --
Herd unit 28 , Study no: 1

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	314	332	4.75	31.85	35.06
Rock	60	143	3.25	12.85	3.88
Pavement	108	206	11.00	0	5.90
Litter	247	387	54.25	36.66	46.38
Cryptogams	4	18	.75	.03	.25
Bare Ground	217	299	26.00	35.43	30.17

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 01, Study Name: Three Creeks

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.7	57.0 (14.7)	7.1	54.2	38.0	7.8	2.2	7.3	28.8	.5



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 1

Type	Quadrat Frequency '92	'98
Rabbit	61	29
Elk	-	7
Deer	18	18
Cattle	5	16

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 1

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	2	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	18	30	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	100%	00%	-50%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'92	40		-
	'98	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	1	3	-	-	-	-	-	-	-	4	-	-	-	133			4
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	1	5	2	-	-	-	-	-	-	8	-	-	-	266	31	31	8
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	44	64	4
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	67%	17%	00%	-75%
'92	20%	00%	00%	+17%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	399	Dec:	0%
	'92	100		20%
	'98	120		0%

Artemisia tridentata vaseyana																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	17	12	-	2	-	-	-	-	-	31	-	-	-	620			31
	98	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33	9	11	1
	92	2	40	3	1	-	-	-	-	-	44	-	2	-	920	-	-	46
	98	40	6	-	-	-	-	-	-	-	46	-	-	-	920	22	30	46
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	7	4	-	-	-	-	-	-	11	-	-	-	220			11
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	100%	00%	00%	+98%
'92	67%	08%	02%	-24%
'98	10%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	0%
	'92	1760		13%
	'98	1340		1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	42	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	+ 0%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	20			-
'98	20			-

Gutierrezia sarothrae																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	87	11	-	-	-	-	-	-	-	-	11	-	-	-	366			11
	92	102	-	-	-	-	-	-	-	-	102	-	-	-	2040			102
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
M	87	141	-	-	-	-	-	-	-	-	141	-	-	-	4700	9	9	141
	92	104	-	-	9	-	-	-	-	-	113	-	-	-	2260	-	-	113
	98	32	-	-	4	-	-	-	-	-	36	-	-	-	720	9	7	36
D	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-16%
'92	00%	00%	00%	-79%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	5132	Dec:	1%
'92	4300		0%
'98	900		2%

Juniperus osteosperma																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40	-	-	2
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	-33%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	-
'92	120		-
'98	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
M	87	10	-	-	-	-	-	-	-	-	10	-	-	-	333	6	7	10
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	10	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	333	Dec:	-
	'92	0		-
	'98	0		-

Opuntia spp.																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	7	-	-	-	-	-	-	-	-	6	-	1	-	233	4	14	7
	92	12	-	-	-	-	-	-	-	-	12	-	-	-	240	-	-	12
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120	5	8	6
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	-	-	-	-	-	-	-	-	-	-	-	4	80			4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	13%	+34%
'92	00%	00%	20%	-65%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	266	Dec:	0%
	'92	400		20%
	'98	140		14%

Pinus edulis																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	92	2	-	2	-	-	-	-	-	-	4	-	-	-	80			4
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+67%
'92	00%	40%	00%	+17%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	-
	'92	100		-
	'98	120		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	2	-	-	-	-	-	-	2	-	-	-	66	6	18	2
	92	2	-	-	-	-	1	-	-	-	1	-	2	-	60	-	-	3
	98	-	3	-	-	-	1	-	-	-	4	-	-	-	80	15	27	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	100%	00%	- 9%
'92	00%	33%	67%	+40%
'98	60%	20%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	66		-
	'92	60		-
	'98	100		-

Trend Study 28-2-98

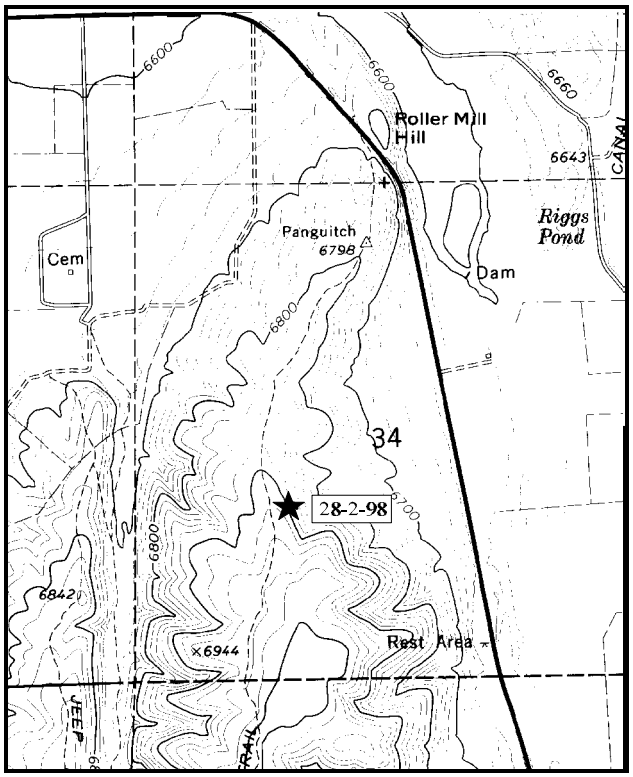
Study site name: Panguitch . Range type: Pinyon-Juniper .

Compass bearing: frequency baseline 345 degrees.

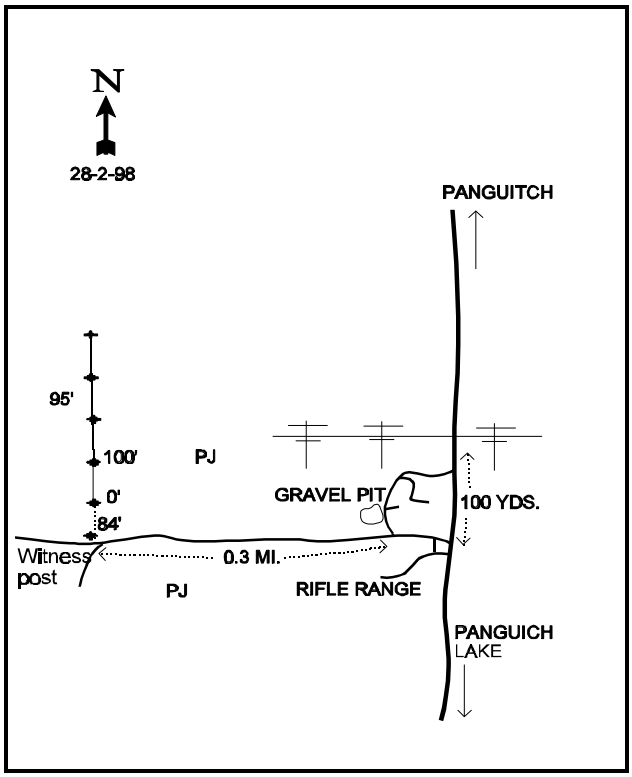
Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the southern end of Panguitch, head south out of town on the Panguitch Lake road for 1.85 miles. At the top of the hill, you will pass under powerlines and then, in about 100 yards, come to a road turning off to the right leading to the rifle range. Immediately after the cattleguard turn right and follow the fence about 100 feet to a faint road heading west. Follow this trail 0.3 miles, behind the rifle range, to a fork. The transect begins just northeast of this fork. There is a witness post on the north side of the road. The 0-foot stake is 14 paces at 335°M from the witness post. The 0-foot baseline stake is a red 18" tall fencepost tagged #7170. The transect runs north through the pinyon and juniper.



Map Name: Panguitch



Diagrammatic Sketch

Township 35S , Range 5W , Section 34

UTM 4183193.184 N, 372796.398 E

DISCUSSION

Trend Study No. 28-2 (47-2)

The Panguitch transect is located in an extensive pinyon-juniper area south of town. Elevation of the site is 7,100 feet. Slope is nearly level (2%) with a northeast aspect. The site samples a black sagebrush flat which is being overtaken by invading pinyon pine and Utah juniper trees. The study was put in the same location as a line-intercept transect established in 1978. Winter range is limited in this high valley on the east side of the plateau. This area may have once been more important, but now receives light use with an estimated 22 deer days use/acre in 1998. These pinyon-juniper woodlands are utilized more as cover while adjacent sagebrush flats and fields near town are used for foraging.

The soil is moderately deep with rock and pavement scattered across the surface. Soil textural analysis indicates a loam with a neutral pH (6.8). The effective rooting depth (see methods) is estimated at almost 18 inches. Potassium could limit vegetative development at an estimated 16 ppm where 70 ppm are thought to be minimal for normal plant development. Even with the nearly level terrain, there is evidence of past erosion. There is little sign of current erosion, but some of the shrubs are pedestaled from past erosion events. The areas with mature pinyon-juniper as cover have an almost complete covering of pavement.

Black sagebrush is the most abundant shrub with an estimated density of 3,999 plants/acre in 1987, increasing to 6,040 by 1992 and then decreasing to 4,060 plants/acre in 1998. Percent decadency increased from 71% in 1987 to 78% in 1992, no seedlings and few young were encountered in 1992, and vigor declined with 53% of the shrubs encountered displaying poor vigor. Currently, the population appears to be improving slightly with a significant decrease in percent decadence and a decrease in the percentage of plants classified with poor vigor. Many young and seedling plants were encountered in 1998 which could help replace the decadent and dead plants. This will likely only stabilize the population for a short period of time. As the photographs show throughout all years, there is an obvious downward trend of black sagebrush, primarily due to increasing numbers of pinyon and juniper trees which shade out smaller shrubs.

Mountain big sagebrush also occurs on the site but in significantly lower numbers. The population density increased from 199 plants/acre in 1987 to 900 plants/acre in 1992. Currently, the estimated density is 200 plants/acre. Percent decadency has increased and the percentage of plants with poor vigor has decreased. There has not been a seedling mountain big sagebrush encountered in any year. Other shrubs which occur on the site include: Parry rabbitbrush, low rabbitbrush, broom snakeweed, and prickly-pear cactus.

Pinyon, and to a lesser extent juniper, definitely dominate the site. Point-centered quarter data taken in 1992 estimated 444 pinyon pine and 18 Utah juniper trees/acre. In 1998, point-centered quarter data indicates 478 pinyon pine and 36 Utah juniper trees/acre. Average tree diameter is 4.4 inches for pinyon pine and 8 inches for Utah juniper. The trees appear to be increasing in areas formerly occupied by sagebrush. Canopy cover is now estimated at 20%, meaning that the understory production is reduced by 50%. This trend will only get worse through time.

Herbaceous vegetation is infrequent, especially under the larger pinyon trees. Five species of native grass were found including blue grama, Indian ricegrass, bottlebrush squirreltail, muttongrass, and needle-and-thread grass. The rings of blue grama appear to be quite old. Forbs are rare and produce very little forage.

1987 APPARENT TREND ASSESSMENT

Due to past erosion, 23% of the ground is covered by erosion pavement. Soil depth is greatest where herbaceous vegetation and cryptogams are present. Litter cover is nonexistent in the interspaces; but litter buildup is found under the shrubs and trees. Shrubs are being crowded out by increasing numbers of pinyon and juniper trees and herbaceous vegetation is sparse. Chaining would improve the browse and herbaceous trends of this site, but the average diameter of pinyon is less than five inches making treatment difficult.

1992 TREND ASSESSMENT

Soil conditions are still poor on the site and appear to be declining with increasing pinyon and juniper cover. Soil movement in the form of sheet erosion is evident, but due to the lack of slope, no gullies have formed yet. Rock and pavement cover provide some protection for the soil in the bare interspaces. Black sagebrush, the only abundant browse, is declining primarily due to the increase in pinyon and juniper tree cover. Percent decadency increased, vigor has declined, and no seedlings, and few young were encountered. Herbaceous plants have also declined. Treatment of the pinyon and juniper will be required to reverse these trends.

TREND ASSESSMENT
soil - down slightly and poor condition
browse - down
herbaceous understory - down

1998 TREND ASSESSMENT

The soil trend is stable with little erosion apparent at this time. Percent vegetation cover declined slightly, while percent litter cover increased. Percent bare ground remained nearly the same. This site is nearly level which decreases the chance that erosion will occur, except under an intense summer storm event. A majority of the vegetation cover is contributed by shrubs or trees (86%), which is not very effective in slowing erosion and runoff as would herbaceous cover closer to the ground. The browse trend is stable for now with substantial losses since 1992. The key browse, black sagebrush, shows a decline in percent decadency and fewer plants were classified in poor vigor. However, there was a loss of one-third of the population since 1992, and all the losses can be explained by the number of dead plants in the population. Biotic potential is good with an estimated 760 seedling plants/acre. Utilization is currently, mostly light. Although this population looks better at this time then it has in the past, this will not likely last with the increasing density and dominance of pinyon pine and Utah juniper. The herbaceous understory trend is stable, but very poor contributing to barely 3% total cover. Grasses and forbs are rare throughout the area, especially under the trees.

TREND ASSESSMENT
soil - stable
browse - stable, the black sagebrush population looks better but likely only for a short time with pinyon pine and Utah juniper trees increasing in density
herbaceous understory - stable, however grasses and forbs are rare

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 2

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Bouteloua gracilis	$_{b}$85	$_{a}$52	$_{a}$46	38	22	21	.72	1.37
G	Oryzopsis hymenoides	$_{b}$34	$_{a}$18	$_{a}$18	16	7	8	.08	.56
G	Poa fendleriana	-	-	8	-	-	4	-	.04
G	Sitanion hystrix	$_{b}$72	$_{a}$41	$_{ab}$54	34	19	25	.20	.97
G	Stipa comata	-	4	10	-	2	4	.03	.19
Total Annual Grasses		0	0	0	0	0	0	0	0
Total Perennial Grasses		191	115	136	88	50	62	1.03	3.14

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
F	Arabis spp.	$_{a}$-	$_{ab}$1	$_{b}$11	-	1	5	.00	.02
F	Astragalus spp.	$_{a}$-	$_{b}$11	$_{b}$6	-	7	4	.03	.02
F	Chaenactis douglasii	-	-	2	-	-	1	-	.00
F	Cruciferae	3	-	-	2	-	-	-	-
F	Cryptantha spp.	-	-	1	-	-	1	-	.00
F	Erigeron pumilus	5	3	4	3	2	3	.01	.04
F	Ipomopsis aggregata	-	3	8	-	1	3	.03	.04
F	Linum lewisii	-	-	3	-	-	2	-	.01
F	Lupinus spp.	-	3	-	-	1	-	.03	-
F	Phlox longifolia	-	5	7	-	2	3	.01	.04
F	Senecio multilobatus	-	-	2	-	-	1	-	.00
F	Sphaeralcea coccinea	8	1	2	4	1	1	.00	.03
Total Annual Forbs		0	0	0	0	0	0	0	0
Total Perennial Forbs		16	27	46	9	15	24	0.12	0.21

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 2

Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Artemisia nova	76	75	11.49	8.67
B	Artemisia tridentata vaseyana	22	7	.15	2.63
B	Chrysothamnus viscidiflorus viscidiflorus	2	3	.03	-
B	Echinocereus spp.	-	-	.01	-
B	Gutierrezia sarothrae	3	14	.00	.07
B	Juniperus osteosperma	4	3	.88	1.00
B	Mammillaria spp.	3	0	-	-
B	Opuntia spp.	4	1	-	-
B	Pinus edulis	30	21	14.21	8.41
B	Sclerocactus	0	1	-	.00
Total for Browse		144	125	26.78	20.81

CANOPY COVER --
Herd unit 28 , Study no: 2

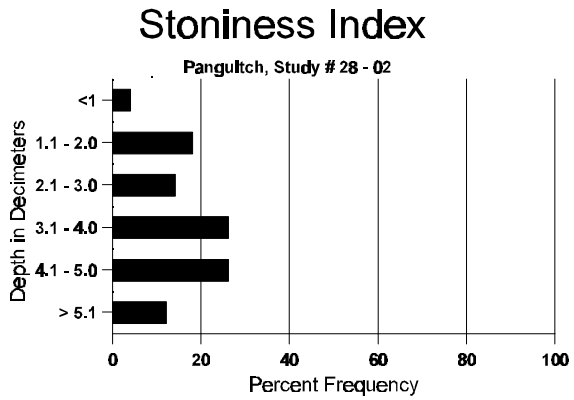
Species	Percent Cover '98
Juniperus osteosperma	2
Pinus edulis	18

BASIC COVER --
Herd unit 28 , Study no: 2

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	142	171	3.75	27.31	25.87
Rock	199	90	1.00	10.07	1.46
Pavement	122	242	23.25	8.36	23.48
Litter	261	381	31.75	33.18	43.62
Cryptogams	148	123	5.00	3.70	2.28
Bare Ground	256	253	35.25	23.83	23.13

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 02, Study Name: Panguitch

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.6	50.2 (17.4)	6.8	46.2	32.0	21.8	1.7	13.5	16.0	.5



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 2

Type	Quadrat Frequency '92	'98
Rabbit	-	21
Deer	-	19

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 2

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	87	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	37	-	-	1	-	-	-	-	-	38	-	-	-	760			38
Y	87	10	4	-	-	-	-	-	-	-	14	-	-	-	466			14
	92	5	-	2	-	-	-	1	-	-	8	-	-	-	160			8
	98	17	-	-	2	-	-	-	-	-	19	-	-	-	380			19
M	87	4	7	10	-	-	-	-	-	-	21	-	-	-	700	13	13	21
	92	18	27	10	-	3	-	1	-	-	57	-	2	-	1180	-	-	59
	98	111	14	-	1	-	-	-	-	-	126	-	-	-	2520	13	21	126
D	87	35	30	20	-	-	-	-	-	-	55	-	-	30	2833			85
	92	45	133	48	2	7	-	-	-	-	76	-	26	133	4700			235
	98	39	18	-	1	-	-	-	-	-	49	-	-	9	1160			58
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	2180			109

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	34%	25%	25%	+34%
'92	56%	20%	53%	-33%
'98	16%	00%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	3999	Dec:		71%
'92	6040			78%
'98	4060			29%

Artemisia tridentata vaseyana																		
Y	87	-	1	3	-	-	-	-	-	-	4	-	-	-	133			4
	92	8	4	-	1	-	-	-	-	-	12	-	1	-	260			13
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33	23	19	1
	92	12	11	-	-	-	-	-	-	-	22	-	-	1	460	-	-	23
	98	4	1	-	-	-	-	-	-	-	5	-	-	-	100	19	23	5
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	92	5	4	-	-	-	-	-	-	-	3	-	3	3	180			9
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	33%	50%	00%	+78%
'92	42%	00%	18%	-78%
'98	10%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	199	Dec:		17%
'92	900			20%
'98	200			30%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60	8	7	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	50%	00%	+33%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	40		-
	'98	60		-

Gutierrezia sarothrae																		
S	87	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	92	15	-	-	-	-	-	1	-	-	16	-	-	-	320			16
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	87	5	-	1	-	-	-	-	-	-	6	-	-	-	200	8	4	6
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	18	-	-	-	-	-	-	-	-	18	-	-	-	360	8	9	18
D	87	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	06%	06%	-85%
'92	00%	00%	00%	+86%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	533	Dec:	6%
	'92	80		0%
	'98	580		0%

Juniperus osteosperma																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	98	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	157	118	1
	92	-	-	-	-	-	-	-	2	-	2	-	-	-	40	-	-	2
	98	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+67%
'92	00%	00%	00%	-20%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	-
	'92	100		-
	'98	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mammillaria spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	1	-	-	3	-	-	-	60			3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	80		-
	'98	0		-

Opuntia spp.																		
M	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4	8	4
	92	2	1	-	1	-	-	-	-	-	3	-	1	-	80	-	-	4
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	13	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-40%
'92	25%	00%	25%	-75%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	133	Dec:	-
	'92	80		-
	'98	20		-

Pinus edulis																		
S	87	12	1	-	-	-	-	-	-	-	10	1	2	-	433			13
	92	4	-	-	-	-	-	6	-	-	8	-	-	2	200			10
	98	2	-	-	4	-	-	-	-	-	6	-	-	-	120			6
Y	87	13	1	-	-	-	-	-	-	-	13	-	-	1	466			14
	92	12	2	-	5	-	-	1	-	-	12	-	4	4	400			20
	98	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	87	7	-	-	-	-	-	9	-	-	16	-	-	-	533	144	110	16
	92	9	1	-	-	-	-	5	-	-	14	-	-	1	300	-	-	15
	98	9	-	-	-	-	-	-	1	-	10	-	-	-	200	-	-	10
D	87	-	-	-	-	-	-	1	-	-	1	-	-	-	33			1
	92	4	-	-	-	-	-	-	-	-	2	-	-	2	80			4
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	03%	00%	03%	-24%
'92	08%	00%	28%	-38%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	1032	Dec:	3%
	'92	780		10%
	'98	480		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sclerocactus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'87	00%	00%	00%
'92	00%	00%	00%
'98	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	0		-
	'98	20		-

Trend Study 28-3-98

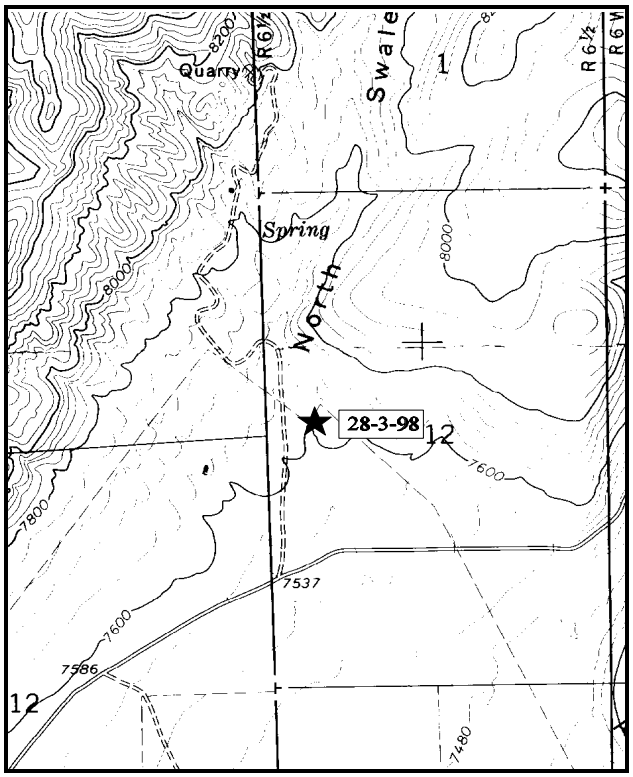
Study site name: Bear Valley . Range type: Chained, Railed Shrubland .

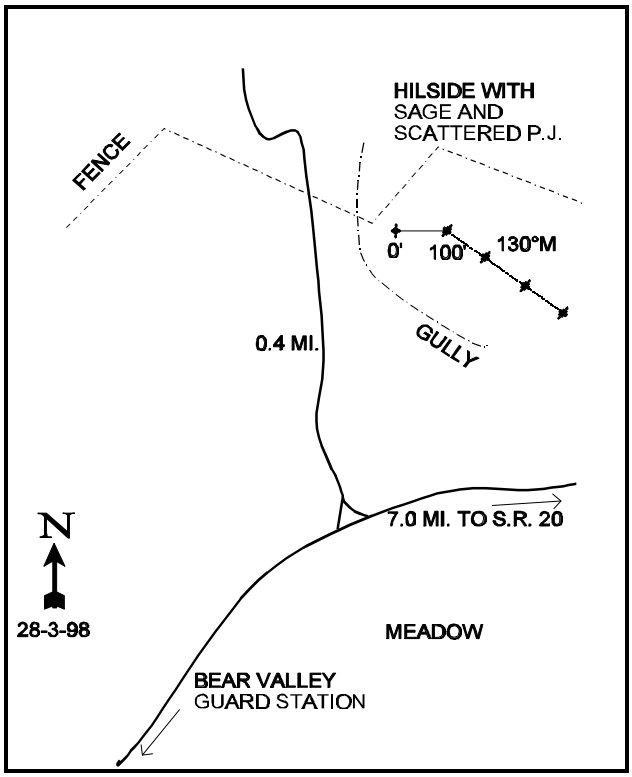
Compass bearing: frequency baseline 77 M degrees. (Lines 2-4 130°M)

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (59ft), line 3 (34ft), line 4 (95ft).

LOCATION DESCRIPTION

From the US 89-SR20 Junction, go approximately 7 miles west on SR20 to a corral past mile marker 14. Turn left on the Little Creek road that leads to Bear Valley. Travel 7.0 miles south on the main road to a minor fork. Turn right and go 0.4 miles to a fence and wire gate. Stop here and walk east along the fenceline to the corner. Walk 4 paces east from the fence corner to a short red fencepost tagged #7163 which is the 0-foot baseline stake.





Map name: Little Creek Peak Diagrammatic Sketch

Township 33S , Range 6 1/2W , Section 12 UTM 4201913.104 N, 360560.220 E

DISCUSSION

Trend Study No. 28-3 (47-3)

The Bear Valley study samples a seeded range at the north end of Upper Bear Valley. Elevation of the site is 7,600 feet with a gently sloping (3-5%) southeast slope. The area is at the upper limits of normal deer winter range that has also shown light use by elk. Pellet group transect data from 1998 indicates 3 elk days use/acre, 19 deer days use/acre, and 65 cow days use/acre.

Soil textural analysis indicates a sandy loam with a moderately acid pH (5.8). The soil is fairly deep with an average effective rooting depth (see methods) of just over 17 inches. Percent vegetative cover is good, but scattered bare areas show evidence of slight erosion. The soil is potentially erodible, as evidenced by a nearby deep gully showing recent down cutting.

Browse is not a prominent forage component on this seeding. Mountain big sagebrush has increased in density since 1992 to an estimated 1,540 plants/acre in 1998, yet it still only contributes to 9% of the browse cover. Age structure currently indicates a mostly young population with good biotic potential. Utilization was moderate in 1987 and 1992, however it has shifted to light use by 1998. Average height has increased from 7 inches in 1992 to 21 inches in 1998. Low rabbitbrush is abundant with an estimated density of 10,666 plants/acre in 1987 and 17,080 plants/acre in 1992. Currently, the estimated density is 11,320 plants/acre, 38% of which are young. The population is slowly becoming more mature with fewer decadent or dead plants present. The plants are vigorous and lightly utilized. Other shrubs in the lower end of the valley include: rubber rabbitbrush, gray horsebrush, snowberry, Wood's rose, and a few lone juniper trees.

The site is dominated by the seeded grasses, crested wheatgrass and western wheatgrass. These grasses are large and vigorous with light to moderate utilization reported in 1998. Blue grama and a sedge are scattered throughout the site and both show a significant decline in nested frequency since 1987. Forbs are less important as winter forage producers, but the lupine, yellow salsify, groundsel, and dandelion provide desirable spring and summer feed. Grasses currently provide about 41% of the herbaceous understory cover, a decrease from 82% estimated in 1992. However, without the increase in four annual forbs, grasses would make up 77% of the herbaceous cover.

1987 APPARENT TREND ASSESSMENT

Ground cover is good in this seeding even though bare soil makes up 18% of the ground cover, which seems high. Most bare spots are covered with rocks or pavement, which covers 17% of the ground surface. The bunch grasses and associated litter provide good ground cover, but there is apparently room for increase. Browse on the site is dominated by low rabbitbrush which appears to be increasing.

1992 TREND ASSESSMENT

The site had recently been grazed, so bare ground estimates were higher than in 1987 with a cover of 37%. Litter cover has also greatly declined with extended drought. No erosion was evident, although some soil pedestaling was noted. Trend for soil is slightly down. The browse trend is slightly down due to the low densities for mountain big sagebrush and rubber rabbitbrush. The less desirable low rabbitbrush has increased to 17,080 plants/acre and maintains a dynamic reproductive potential. Trend for herbaceous understory is stable. Nested frequencies of perennial grasses and forbs showed little change.

TREND ASSESSMENT
soil - slightly down
browse - slightly down
herbaceous understory - stable

1998 TREND ASSESSMENT

The soil trend is slightly upward with an increase in percent vegetation and litter cover. Erosion potential is still present, but is greatly reduced due to the levelness of the site. The browse trend is stable. The mountain big sagebrush density has increased since 1992, but this is a mostly young population that still needs to become established. The population exhibits good biotic potential, no decadency, and light utilization. The low rabbitbrush population density is fluctuating between years most likely due to precipitation patterns. The herbaceous understory trend is stable. Even though total perennial herbaceous understory sum of nested frequency has increased since 1992, grasses remain an important component for wildlife during the winter. Perennial grass sum of nested frequency has declined slightly, while perennial forb sum of nested frequency has increased since 1992.

TREND ASSESSMENT
soil - slightly upward
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	$_{b}$320	$_{a}$297	$_{ab}$299	98	98	98	17.26	17.40
G	Agropyron smithii	41	73	58	20	32	22	.31	.45
G	Bouteloua gracilis	$_{b}$32	$_{ab}$25	$_{a}$7	14	10	3	.43	.21
G	Bromus tectorum (a)	-	-	18	-	-	7	-	.52
G	Carex spp.	$_{b}$19	$_{b}$10	$_{a}$-	8	5	-	.02	-
G	Elymus junceus	3	1	2	1	1	1	.00	.00
G	Poa pratensis	$_{a}$5	$_{a}$2	$_{b}$12	2	1	7	.03	.37
G	Stipa comata	$_{ab}$27	$_{b}$44	$_{a}$13	13	17	5	1.10	.37
Total Annual Grasses		0	0	18	0	0	7	0	0.52
Total Perennial Grasses		447	452	391	156	164	136	19.17	18.82
F	Agoseris glauca	-	-	2	-	-	1	-	.00
F	Androsace septentrionalis (a)	-	$_{a}$15	$_{b}$162	-	6	67	.03	2.82
F	Arabis spp.	2	-	-	2	-	-	-	-
F	Artemisia ludoviciana	11	3	11	3	1	4	.00	.56
F	Astragalus panguicensis	3	8	2	1	3	2	.02	.01
F	Chaenactis douglasii	3	-	-	1	-	-	-	-
F	Cirsium spp.	-	8	4	-	3	2	.04	.15
F	Collinsia parviflora (a)	-	-	112	-	-	40	-	.91

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
F	Crepis acuminata	-	-	4	-	-	2	-	.01
F	Descurainia spp. (a)	-	-	2	-	-	1	-	.00
F	Dracocephalum parviflorum	-	-	3	-	-	3	-	.01
F	Epilobium paniculatum (a)	-	-	1	-	-	1	-	.00
F	Eriogonum cernuum (a)	-	4	-	-	2	-	.01	-
F	Erigeron flagellaris	1	-	-	1	-	-	-	-
F	Euphorbia spp.	-	-	3	-	-	1	-	.03
F	Ipomopsis aggregata	-	-	1	-	-	1	-	.00
F	Lappula occidentalis (a)	-	$_{a}$12	$_{b}$116	-	6	51	.03	1.89
F	Lepidium spp. (a)	-	2	-	-	1	-	.00	-
F	Lupinus argenteus	$_{b}$91	$_{a}$70	$_{b}$109	46	31	55	2.97	1.35
F	Lygodesmia spinosa	$_{a}$10	$_{b}$16	$_{ab}$14	5	5	5	.27	.39
F	Microsteris gracilis (a)	-	$_{a}$3	$_{b}$216	-	1	76	.00	2.27
F	Oenothera coronopifolia	$_{a}$-	$_{a}$-	$_{b}$10	-	-	4	-	.07
F	Oenothera pallida	$_{b}$35	$_{a}$9	$_{ab}$27	18	4	9	.05	.31
F	Penstemon spp.	-	-	1	-	-	1	-	.00
F	Phlox longifolia	$_{a}$50	$_{a}$61	$_{b}$140	28	30	62	.15	.86
F	Polygonum douglasii (a)	-	$_{a}$31	$_{b}$94	-	14	36	.07	1.00
F	Senecio douglasii	$_{b}$30	$_{b}$27	$_{a}$1	15	14	1	.54	.00
F	Sphaeralcea coccinea	$_{a}$-	$_{a}$-	$_{b}$9	-	-	4	-	.07
F	Taraxacum officinale	11	5	12	6	2	7	.01	.06
F	Tragopogon dubius	$_{a}$18	$_{a}$1	$_{b}$55	8	1	25	.00	.62
F	Unknown forb-annual	-	-	37	-	-	15	-	.12
Total Annual Forbs		0	67	703	0	30	272	0.14	6.63
Total Perennial Forbs		265	208	445	134	94	204	4.07	6.98

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 3

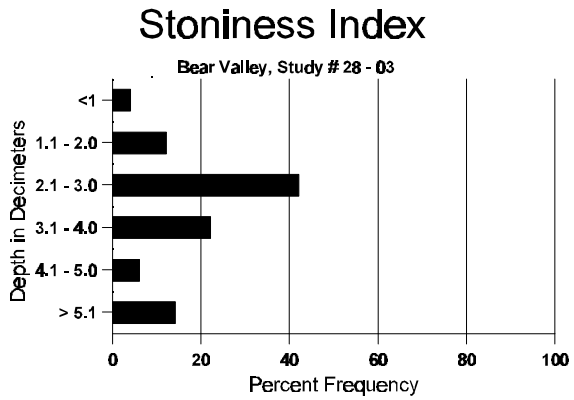
Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Artemisia tridentata vaseyana	5	31	.13	1.25
B	Chrysothamnus nauseosus	1	13	.15	1.25
B	Chrysothamnus nauseosus albicaulis	0	6	-	-
B	Chrysothamnus viscidiflorus	99	99	4.56	10.96
B	Symphoricarpos oreophilus	0	0	-	-
B	Tetradymia canescens	5	6	.44	.21
Total for Browse		110	155	5.28	13.68

BASIC COVER --
Herd unit 28 , Study no: 3

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	326	365	7.00	28.50	45.32
Rock	19	49	4.75	6.33	.26
Pavement	129	319	11.50	0	11.18
Litter	290	394	58.50	25.89	48.66
Cryptogams	3	4	0	0	.00
Bare Ground	254	333	18.25	37.15	28.85

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 03, Study Name: Bear Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.3	50.0 (17.7)	5.8	64.2	20.0	15.8	2.3	19.9	1542.4	.3



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 3

Type	Quadrat Frequency '92	'98
Rabbit	88	19
Elk	-	2
Deer	10	23
Cattle	3	29

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 3

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	87	2	2	-	1	-	-	-	-	-	5	-	-	-	333			5
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	58	2	-	-	-	-	-	-	-	45	-	15	-	1200			60
M	87	5	3	1	-	-	-	-	-	-	8	-	1	-	600	7	6	9
	92	2	3	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
	98	12	5	-	-	-	-	-	-	-	16	-	1	-	340	21	28	17
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	36%	07%	07%	-87%
'92	50%	00%	00%	+92%
'98	09%	00%	21%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	933	Dec:		-
'92	120			-
'98	1540			-

Chrysothamnus nauseosus																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	87	3	-	-	-	-	-	-	-	-	1	2	-	-	200	20	13	3
	92	-	1	-	-	-	-	-	-	-	-	-	1	-	20	-	-	1
	98	23	-	-	-	-	-	-	-	-	23	-	-	-	460	11	17	23

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-92%
'92	100%	00%	100%	+98%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	266	Dec:		-
'92	20			-
'98	560			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	21	-	1	2	-	-	-	-	-	24	-	-	-	480			24
	98	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
Y	87	96	1	-	-	-	-	-	-	-	92	1	4	-	6466			97
	92	371	73	9	-	-	-	-	-	-	453	-	-	-	9060			453
	98	213	-	-	-	-	-	-	-	-	169	44	-	-	4260			213
M	87	54	-	-	-	-	-	-	-	-	49	-	4	1	3600	17	12	54
	92	346	28	1	-	-	-	-	-	-	374	1	-	-	7500	-	-	375
	98	325	18	-	-	-	-	-	-	-	217	116	10	-	6860	14	16	343
D	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	92	21	4	1	-	-	-	-	-	-	18	-	6	2	520			26
	98	10	-	-	-	-	-	-	-	-	-	8	-	2	200			10
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	.62%	00%	06%	+38%
'92	12%	01%	0.93%	-34%
'98	03%	00%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	10666	Dec:		6%
'92	17080			3%
'98	11320			2%

Symphoricarpos oreophilus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	14	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	-
'92	0		-
'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	6	1	-	-	-	-	-	-	-	7	-	-	-	140	-	-	7
	98	7	1	-	-	-	-	-	-	-	8	-	-	-	160	14	21	8
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	08%	00%	00%	-25%
'98	11%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		0%
	'92	240		8%
	'98	180		0%

Trend Study 28-4-98

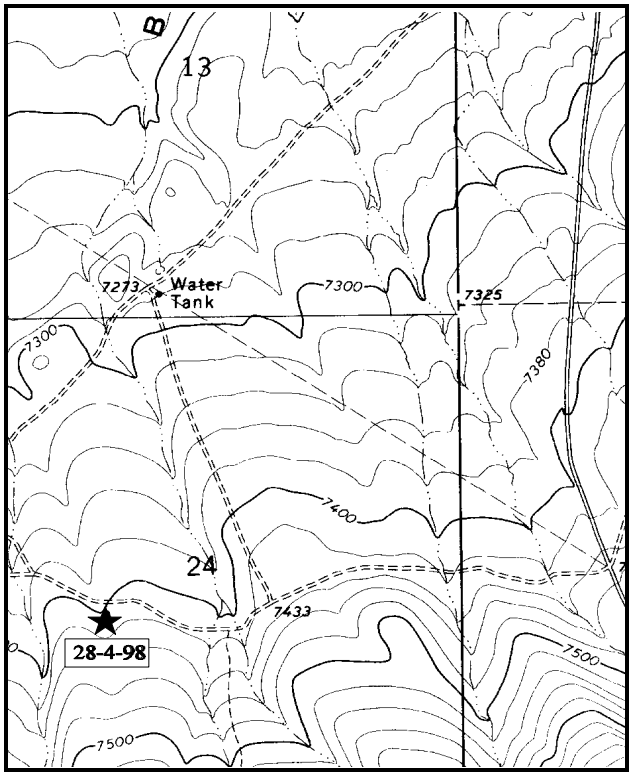
Study site name: Buckskin Valley . Range type: Mixed Mountain Brush .

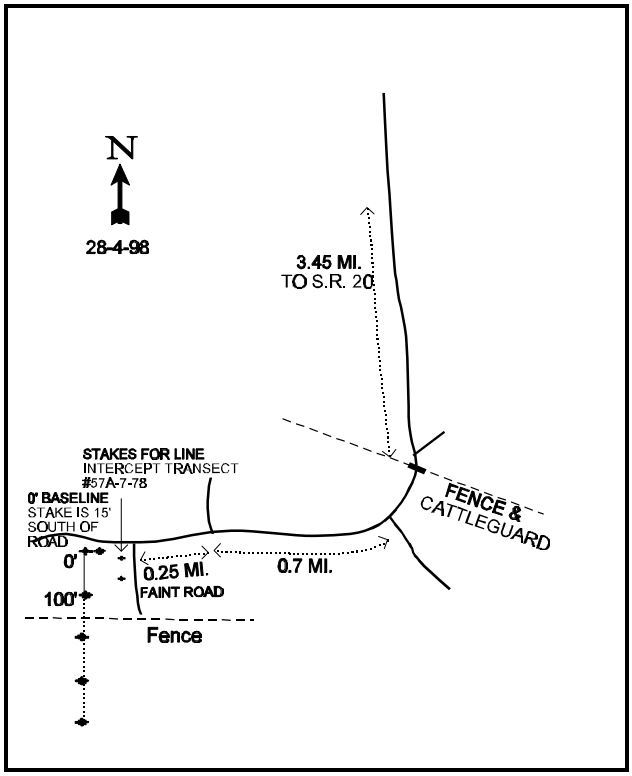
Compass bearing: frequency baseline 182 M degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From SR 20 just west of mile marker 7, turn south onto the Buckskin Valley road. Travel 3.45 miles to a cattleguard. Just beyond the fence and cattleguard, bear right and proceed west 0.95 miles to an intersection where a very faint road goes to the south. About 60 feet west of this intersection, and 15 feet south of the main road, is the 0-foot baseline stake. This 2-foot tall green fencepost is marked by a red browse tag #9005. The frequency baseline runs south-southwest from here. The old line-intercept transect 57A-7-78 is marked by a red-painted steel fencepost 10 feet east of the new study.





Map Name: Burnt Peak Diagrammatic Sketch

Township 32S , Range 7W , Section 24 UTM 4207346.233 N, 359510.770 E

DISCUSSION

Trend Study No. 28-4 (47-4)

Buckskin Valley, located on the northern end of the unit, is important as transitional range. Elevation of the site is 7,400 feet on a gentle (5%) north slope. A variety of browse, dominated by sagebrush, is available throughout the valley. The lower areas have been extensively treated by the BLM to enhance livestock grazing. The area of the transect, in the upper part of the valley, is a cattle-sheep allotment used for late spring grazing. Cattle were on the site during the 1992 reading in early August. A pellet group transect read on the study site in 1998 indicates 49 deer days use/acre and 7 cow days use/acre.

Soil textural analysis indicates a loam with a moderately acid pH (5.9). The average effective rooting depth (see methods) is just over 14 inches. The soil is dark in color and rocks are fairly common on the surface. There is evidence of compaction and crusting due to the relatively high clay content (26%), however erosion is not a problem. Vegetation and litter provide abundant cover which helps protect the soil.

A moderately dense stand of mountain big sagebrush dominates the study site with an estimated density of 5,160 plants/acre in 1998. This estimated density is lower then the 1987 estimate of 8,732 plants/acre and the 1992 estimate of 8,980 plants/acre. Mountain big sagebrush currently has a cover estimate of 25%. The proportion of decadent plants increased from 36% in 1987 to 56% in 1992, then decreased to 26% in 1998. Few seedlings were observed during any year. Biotic potential is still very low, but is slowly increasing. Utilization of sagebrush increased in 1992, yet utilization has subsequently decreased to light and moderate use. The proportion of plants displaying poor vigor increased from 7% in 1987 to 16% in 1992, then it declined to 8% in 1998.

Interspersed in the dense sagebrush canopy are highly preferred bitterbrush plants. Density of bitterbrush increased from 1,732 plants/acre in 1987 to 3,080 plants/acre in 1992. The density then decreased to 1,900 plants/acre in 1998. In 1992, 34% of the population were classified as young and 55% were classified as mature. In 1998, 15% of the population were classified as young and 85% were classified as mature. Biotic potential remains good with many seedlings encountered in 1998. During the 1987 reading, 73% of the bitterbrush displayed heavy use. By 1992, 53% of the shrubs were heavily browsed and this has declined slightly to 43% in 1998. The proportion of the plants that exhibit poor vigor is low over all years. Other important browse species which occur in smaller numbers on the site include Gambel oak and snowberry, both of which were moderately hedged in 1992 and lightly hedged in 1998. Less desirable browse encountered on the site include the aggressive increasers prickly-pear cactus and stickyleaf low rabbitbrush.

Sheltered by the dense shrub overstory is a variety of fairly abundant herbaceous species. Western wheatgrass, bottlebrush squirreltail, and Kentucky bluegrass are the predominant grasses. One disturbing change is the significant increase in the nested frequency of cheatgrass since 1992. Perennial grass sum of nested frequency is currently declining, while annual grass sum of nested frequency is increasing. Twenty-five perennial forbs were encountered in frequency plots in 1998. Common palatable species include: sulfur buckwheat, redroot buckwheat, lupine, and clover. As with the perennial grasses, forb perennial sum of nested frequency has declined from 508 in 1992 to 358 in 1998.

1987 APPARENT TREND ASSESSMENT

Soil is well protected from erosion on this site with litter providing an estimated 75% ground cover. Overstory and basal vegetative cover is also good, leaving only 9% bare soil exposed. The soil trend appears stable. The sagebrush population is overly mature with little reproductive potential and a high proportion of decadent plants. Bitterbrush has a younger population with good biotic and reproductive potentials. However, 73% of the bitterbrush encountered displayed heavy use. Trend for these key browse species appears stable for the time being. Herbaceous plants are diverse and fairly abundant.

1992 TREND ASSESSMENT

The soil trend appears stable with abundant litter and vegetation cover with 15% bare ground. Browse trend is down for sagebrush due to low biotic and reproductive potentials and increased heavy use and increases in percent decadency, now at 56%. Sagebrush makes up 72% of the total browse cover. Trend for bitterbrush is up slightly, but it is still being heavily utilized and it only makes up 17% of the browse cover. Overall, the browse trend is slightly down. The herbaceous understory is diverse and abundant. Grasses account for 18% of the total vegetative cover while forbs make up 13%. Perennial herbaceous understory sum of nested frequency slightly increased indicating a slightly upward trend.

TREND ASSESSMENT
soil - stable
browse - slightly down
herbaceous understory - slightly upward

1998 TREND ASSESSMENT

The soil trend is slightly upward with an increase in the proportion of protective ground cover. Although percent bare ground increased slightly, there is adequate vegetative and litter cover to protect against erosion. Ideally, percent browse cover would be lower and more of the cover would be contributed by the herbaceous understory. While browse dominates the site, the herbaceous understory cover will remain low as the grasses and forbs are shaded out. The browse trend is slightly downward. The mountain big sagebrush population will continue to decline as long as the biotic potential stays low. The mountain big sagebrush population has lower percent decadency then 1992, but the percentage of decadent plants classified as dying increased. A slight thinning of the mountain big sagebrush population could occur without being detrimental to the mountain big sagebrush community and actually be beneficial to the herbaceous understory. The antelope bitterbrush population is healthy with good biotic potential and many young plants encountered. The herbaceous understory trend is downward with a decrease in perennial herbaceous understory sum of nested frequency from 919 in 1992 to 705 in 1998. Cheatgrass has significantly increased in nested frequency since 1992 and could easily dominate the understory in a matter of years. If this happens, the site is at risk of being lost due to a wildfire.

TREND ASSESSMENT
soil - slightly upward
browse - slightly downward
herbaceous understory - downward

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	-	-	6	-	-	2	-	.06
G	Agropyron smithii	$_{ab}$173	$_{b}$185	$_{a}$136	61	65	48	4.03	1.58
G	Agropyron spicatum	-	-	2	-	-	1	-	.00
G	Bromus ciliatus	-	2	-	-	1	-	.01	-
G	Bromus tectorum (a)	-	$_{a}$42	$_{b}$167	-	17	58	.11	2.90
G	Poa fendleriana	$_{a}$37	$_{b}$47	$_{ab}$33	21	20	14	1.52	.95
G	Poa pratensis	$_{a}$-	$_{a}$-	$_{b}$44	-	-	14	-	2.20

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Poa secunda	-	3	2	-	3	2	.01	.01
G	Sitanion hystrix	119	115	89	42	46	39	2.17	1.43
G	Stipa comata	$_{a}$5	$_{b}$31	$_{a}$2	3	11	2	.18	.01
G	Stipa lettermani	$_{a}$-	$_{b}$28	$_{b}$33	-	15	14	.51	.22
Total Annual Grasses		0	42	167	0	17	58	0.11	2.90
Total Perennial Grasses		334	411	347	127	161	136	8.46	6.47
F	Agoseris glauca	-	-	4	-	-	3	-	.04
F	Allium spp.	-	3	1	-	1	1	.00	.00
F	Arabis holboellii	$_{b}$44	$_{b}$27	$_{a}$2	18	12	2	.06	.01
F	Astragalus convallarius	1	8	5	1	4	3	.67	.06
F	Astragalus panguicensis	$_{a}$6	$_{ab}$9	$_{b}$27	3	6	12	.03	.36
F	Astragalus spp.	$_{ab}$15	$_{b}$16	$_{a}$1	8	10	1	.07	.09
F	Balsamorhiza sagittata	-	-	2	-	-	1	-	.00
F	Calochortus nuttallii	2	-	5	2	-	3	-	.01
F	Chaenactis douglasii	$_{b}$84	$_{a}$32	$_{a}$12	44	15	5	.17	.02
F	Cirsium wheeleri	$_{b}$35	$_{ab}$24	$_{a}$16	22	12	8	.38	.41
F	Comandra pallida	5	7	6	2	2	2	.03	.03
F	Collinsia parviflora (a)	-	$_{a}$115	$_{b}$262	-	46	84	.55	2.22
F	Crepis acuminata	$_{a}$-	$_{b}$9	$_{b}$6	-	4	5	.04	.05
F	Erigeron eatonii	11	-	-	5	-	-	-	-
F	Erigeron spp.	-	-	2	-	-	1	-	.00
F	Eriogonum racemosum	41	32	24	18	16	13	.28	.14
F	Eriogonum umbellatum	19	18	8	8	9	4	.07	.09
F	Ipomopsis aggregata	2	-	-	1	-	-	-	-
F	Linum lewisii	-	-	2	-	-	1	-	.03
F	Lithophragma	-	-	3	-	-	1	-	.03
F	Lomatium spp.	$_{a}$-	$_{b}$9	$_{a}$-	-	5	-	.03	-
F	Lupinus argenteus	31	45	55	17	22	26	1.42	3.22
F	Machaeranthera canescens	$_{b}$36	$_{a}$4	$_{a}$2	21	2	1	.04	.00
F	Microsteris gracilis (a)	-	$_{b}$112	$_{a}$61	-	44	22	.44	.26
F	Phlox longifolia	$_{a}$118	$_{b}$177	$_{a}$115	65	71	41	1.02	.97
F	Polygonum douglasii (a)	-	-	4	-	-	3	-	.04
F	Senecio douglasii	4	-	-	1	-	-	-	-
F	Senecio multilobatus	$_{b}$18	$_{a}$1	$_{a}$1	12	1	1	.00	.00
F	Sphaeralcea coccinea	8	4	4	3	2	2	.01	.01
F	Taraxacum officinale	$_{b}$6	$_{ab}$1	$_{a}$-	4	1	-	.03	-
F	Tragopogon dubius	8	2	7	5	1	3	.00	.04
F	Trifolium spp.	$_{a}$16	$_{b}$42	$_{b}$43	7	21	19	.15	.31
F	Zigadenus paniculatus	$_{a}$7	$_{b}$38	$_{a}$5	4	19	3	.82	.04

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
Total Annual Forbs		0	112	327	0	44	109	0.44	2.52
Total Perennial Forbs		517	623	358	271	282	162	5.93	6.03

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 4

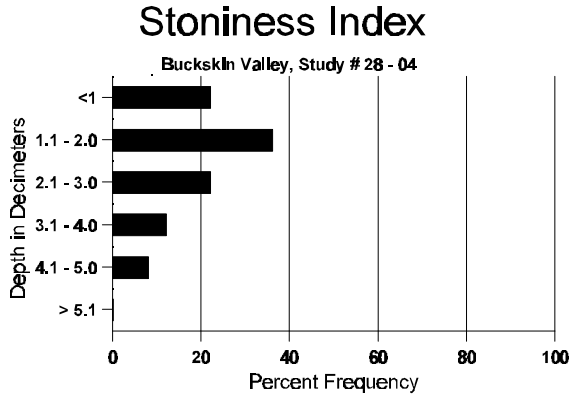
Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Artemisia tridentata vaseyana	98	94	24.29	24.87
B	Cercocarpus ledifolius	0	0	-	-
B	Chrysothamnus depressus	1	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	0	-	-
B	Juniperus scopulorum	1	1	-	.03
B	Opuntia spp.	44	28	1.29	1.03
B	Purshia tridentata	79	65	5.57	8.25
B	Quercus gambelii	2	3	1.62	.56
B	Symphoricarpos oreophilus	17	17	.77	3.24
Total for Browse		244	208	33.56	38.00

BASIC COVER --
Herd unit 28 , Study no: 4

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	352	355	7.50	42.98	50.00
Rock	227	120	5.50	5.53	4.95
Pavement	34	114	1.00	1.26	1.68
Litter	265	395	74.50	59.12	66.59
Cryptogams	74	40	2.25	1.64	.98
Bare Ground	276	200	9.25	14.50	16.27

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 04, Study Name: Buckskin Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.3	50.4 (15.7)	5.9	44.2	30.0	25.8	3.8	22.7	236.8	.4



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 4

Type	Quadrat Frequency '92	'98
Sheep	-	1
Rabbit	44	22
Elk	-	1
Deer	28	37
Cattle	-	2

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 4

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	1	-	-	6	-	-	1	-	-	8	-	-	-	160			8
	98	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
Y	87	7	6	1	-	-	-	-	-	-	14	-	-	-	933			14
	92	3	10	-	-	-	-	1	-	-	14	-	-	-	300			15
	98	9	1	-	-	-	-	-	-	-	10	-	-	-	200			10
M	87	15	42	13	-	-	-	-	-	-	70	-	-	-	4666	26	28	70
	92	34	101	43	-	5	-	-	-	-	183	-	-	-	3660	-	-	183
	98	93	83	6	-	-	-	-	-	-	176	4	2	-	3640	29	37	182
D	87	14	21	12	-	-	-	-	-	-	38	-	-	9	3133			47
	92	42	96	99	4	8	-	1	-	-	171	8	31	40	5020			251
	98	42	18	6	-	-	-	-	-	-	48	-	2	16	1320			66
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	53%	20%	07%	+ 3%
'92	49%	32%	16%	-43%
'98	40%	05%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	8732	Dec:	36%
	'92	8980		56%
	'98	5160		26%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	0			-
'98	0			-

Chrysothamnus depressus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	28	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	20			-
'98	0			-

Chrysothamnus viscidiflorus viscidiflorus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	40			-
'98	0			-

Juniperus scopulorum																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	100%	00%	00%	+ 0%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	20			-
'98	20			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	87	3	-	-	-	-	-	-	-	-	2	-	-	1	200			3
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	7	-	-	-	-	-	-	-	-	2	-	2	3	466			7
	92	19	-	-	4	-	-	18	-	-	39	-	2	-	820			41
	98	4	-	1	1	-	-	-	-	-	6	-	-	-	120			6
M	87	7	3	-	-	-	-	-	-	-	6	-	2	2	666	3	4	10
	92	43	-	2	6	-	-	5	-	-	47	-	9	-	1120	-	-	56
	98	24	-	-	4	-	-	-	-	-	28	-	-	-	560	6	13	28
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	10	-	-	-	-	-	-	-	-	-	-	6	4	200			10
	98	3	-	-	-	-	-	-	-	-	1	-	-	2	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	18%	00%	53%	+47%
'92	00%	02%	20%	-65%
'98	00%	03%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1132	Dec:		0%
'92	2140			9%
'98	740			8%

Purshia tridentata																		
S	87	6	5	2	-	-	-	-	-	-	13	-	-	-	866			13
	92	3	-	-	-	-	-	4	-	-	7	-	-	-	140			7
	98	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	87	2	4	7	-	-	-	-	-	-	13	-	-	-	866			13
	92	4	10	10	7	15	1	6	-	-	53	-	-	-	1060			53
	98	6	5	-	3	-	-	-	-	-	14	-	-	-	280			14
M	87	-	1	12	-	-	-	-	-	-	13	-	-	-	866	22	31	13
	92	-	12	54	-	11	7	1	-	-	84	-	1	-	1700	-	-	85
	98	6	20	27	-	7	18	-	-	-	77	-	-	1	1560	22	35	78
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	9	1	5	-	-	-	1	12	-	4	-	320			16
	98	1	1	-	-	1	-	-	-	-	2	-	-	1	60			3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	19%	73%	00%	+44%
'92	34%	53%	03%	-38%
'98	36%	47%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1732	Dec:		0%
'92	3080			10%
'98	1900			3%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	6	-	-	-	-	-	6	-	-	-	120			6
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	-	-	-	2	-	-	3	-	-	5	-	-	-	100			5
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	8	-	8	-	-	16	-	-	-	320	-	-	16
	98	18	-	-	-	-	-	-	-	-	18	-	-	-	360	75	39	18
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	2	-	-	-	-	-	-	-	-	-	-	2	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	50%	00%	00%	+71%
'92	43%	00%	09%	-13%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	133	Dec:		0%
'92	460			9%
'98	400			0%

Symphoricarpos oreophilus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	3	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	6	1	-	-	-	-	-	-	-	7	-	-	-	466			7
	92	5	4	-	1	-	-	-	-	-	10	-	-	-	200			10
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133	20	19	2
	92	1	3	3	2	13	-	2	-	-	21	-	3	-	480	-	-	24
	98	4	11	-	14	1	-	-	-	-	30	-	-	-	600	14	25	30
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	22%	00%	00%	+14%
'92	57%	11%	09%	+ 3%
'98	33%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	599	Dec:		0%
'92	700			3%
'98	720			0%

Trend Study 28-5-98

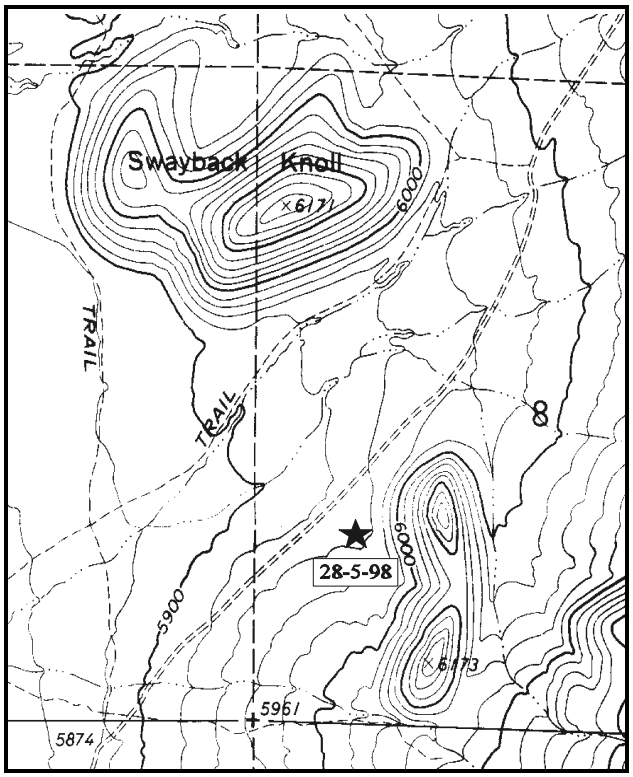
Study site name: Swayback Knoll . Range type: Big Sagebrush .

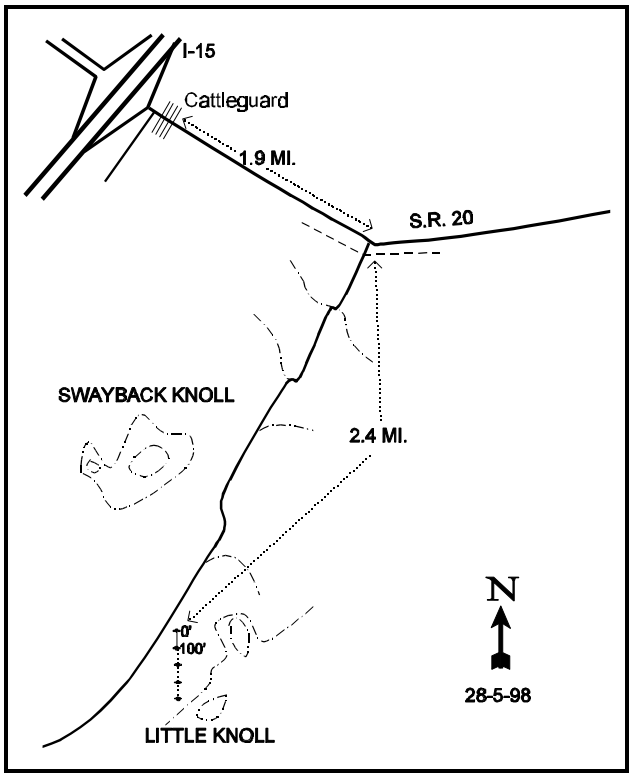
Compass bearing: frequency baseline 179 degrees

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the cattleguard of SR 20 and I-15, travel 1.9 miles on SR 20 to a dirt road on the right. Travel south for 2.4 miles to a sage flat west of rocky knolls. There is a witness post on the right side of the road. The 0-foot baseline stake is 200 feet away from the witness post, on a bearing 130 degrees. The 0-foot stake is marked by browse tag #477.





Map Name: Buckhorn Flat

Diagrammatic Sketch

Township 32S , Range 7W , Section 8

UTM 4210615.888 N, 352661.787 E

DISCUSSION

Trend Study No. 28-5 (47-5)

The Swayback Knoll trend study samples critical deer winter range below the Hurricane Cliff in the northwest corner of the Panguitch Lake management unit. Elevation is 6,100 feet with a gentle (5%) northwest slope. The range for many miles around is dominated by a depleted Wyoming big sagebrush type near some pinyon-juniper covered hills, which would be the nearest protective cover available. Very little other forage is available. The acreage of range available to deer is limited by the deer-proof fence along I-15 and predominance of agricultural land which is also being fenced to prevent deer depredation. The area is administered by the BLM. A pellet group transect read in 1998 determined that there was an estimated 82 deers days use/acre. Some dead deer and a 4-point deer antler drop were found near the site in 1998.

Soil textural analysis indicates a loam soil with a neutral pH (6.7). The average effective rooting depth (see methods) was almost 12 inches with rock and pavement scattered throughout the soil profile. Some soil loss occurs from the bare interspaces, but erosion currently appears minimal. The shrub interspaces have a continuous, unbroken surface of rocks and erosion pavement. Rocks are of igneous origin (basalt), which causes higher soil temperatures (66°F at 13 inches) during the summer months. Two small active gullies are located near the study site. Both phosphorus and potassium may limit vegetative growth with estimates of 9.7 ppm and 67.2 ppm respectively in the soil. Values of 10 ppm and 70 ppm respectively are thought to be minimal for normal plant development.

The only browse species encountered on the site consists of a moderately dense stand of Wyoming big sagebrush and a small amount of prickly-pear cactus. Wyoming big sagebrush density was estimated at 4,866 plants/acre in 1987 and 5,900 plants/acre in 1992. In 1998, density was estimated to be 4,240 plants/acre. Age structure continues to indicate a stable population with an adequate number of seedlings and young establishing to replace decadent and dying plants. Utilization of sagebrush was heavy in 1987, moderate to heavy in 1992, and currently it is mostly moderate. Vigor is generally good and percent decadency has dropped from 29% in 1987 and 1992 to 22% in 1998. Cover is currently estimated to be just over 12%.

Desirable herbaceous vegetation is very limited and diversity is low, even for a Wyoming big sagebrush type. Only three perennial grasses were encountered in 1987, the most common being bottlebrush squirreltail. No perennial forbs were found. During the 1992 reading, five perennial grasses were sampled, with bottlebrush squirreltail, galleta, and purple three-awn being the most numerous. Two annual grasses, cheatgrass and six weeks fescue, contributed 15% of the herbaceous understory cover in 1992. In 1998, cheatgrass now dominates the site by providing 81% of the herbaceous understory cover and 53% of the total vegetative cover. Due to the fine fuels provided by dried cheatgrass, the site is now primed for a major wildfire and the total loss of the browse if a fire event occurs.

1987 APPARENT TREND ASSESSMENT

An almost complete ground covering of rock and erosion pavement is interrupted only by litter under the shrubs and occasional bare patches. This amounts to an estimated 50% ground cover from rock and pavement and 18% exposed soil. Basal vegetative cover is low due to the lack of herbaceous vegetation. Sagebrush is heavily hedged, but has good vigor and an adequate number of seedlings and young. Herbaceous vegetation is deficient. Only three perennial grasses and no perennial forbs were encountered. High surface temperatures and dry conditions are likely responsible for the lack of herbaceous plants. This trend will likely reverse itself with increased precipitation.

1992 TREND ASSESSMENT

Soil conditions are similar to those of 1987. Litter and bare ground have increased. The soil is adequately protected by the vegetation canopy and a continuous layer of rock and pavement. Some soil movement was

evident this year, likely due to recent high intensity thunder storms, but erosion on the site is minimal. Trend for sagebrush is stable due to decreased heavy utilization and a stable decadency rate. Vigor, however has declined slightly with 10% of the shrubs sampled displaying poor vigor compared to 4% in 1987. The herbaceous understory has improved considerably since the last reading but composition is poor, especially for forbs.

TREND ASSESSMENT
soil - down, with a large increase in bare soil, poor condition
browse - stable
herbaceous understory - up, but poor grass and forb composition with very few perennial forbs

1998 TREND ASSESSMENT

The soil trend is slightly upward. Although percent bare ground cover has decreased by nearly 50%, and percent vegetative cover has more then doubled, the cover is mostly provided by cheatgrass. Although cheatgrass does provide some soil protection, it is not as effective at protecting the soil from overland flow as perennial grasses or forbs. The browse trend is slightly down, with continued losses to the population which appeared to have peaked in 1992. The Wyoming big sagebrush population appears more healthy with a fairly good biotic potential. As cheatgrass density and cover increases in the future, there may be a decrease in the number of seedling and young plants encountered due to early spring drying soils from competition with cheatgrass. Also, as cheatgrass density and cover increases in the future, there is a risk of losing the Wyoming big sagebrush population due to a catastrophic fire. The herbaceous trend is downward. Cheatgrass now dominates the site. While individual perennial species nested frequency has not significantly declined since 1992, overall perennial grass sum of nested frequency has declined. Forbs are currently almost non-existent and provide little cover or forage to this site.

TREND ASSESSMENT
soil - slightly upward
browse - slightly down, dense understory of fine fuels which could eventually be catastrophic to the browse population
herbaceous understory - downward

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Aristida purpurea	a13	b41	ab28	7	19	14	1.31	.94
G	Bouteloua gracilis	-	-	3	-	-	1	-	.15
G	Bromus tectorum (a)	-	a168	b357	-	70	99	.68	19.37
G	Hilaria jamesii	a-	b48	b32	-	20	13	.90	.39
G	Oryzopsis hymenoides	2	5	6	1	3	3	.09	.23
G	Sitanion hystrix	b127	a86	a60	53	35	32	3.43	1.41
G	Stipa comata	a-	b11	b15	-	5	6	.15	.25
G	Vulpia octoflora (a)	-	b135	a59	-	53	27	.51	.16
Total Annual Grasses		0	303	416	0	123	126	1.19	19.53
Total Perennial Grasses		142	191	144	61	82	69	5.90	3.39

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
F	Allium spp.	-	1	-	-	1	-	.00	-
F	Calochortus nuttallii	$_{a}$-	$_{b}$8	$_{ab}$2	-	5	2	.02	.01
F	Descurainia spp. (a)	-	$_{b}$16	$_{a}$2	-	9	2	.04	.03
F	Draba spp. (a)	-	-	3	-	-	1	-	.00
F	Eriogonum cernuum (a)	-	$_{b}$24	$_{a}$-	-	13	-	.06	-
F	Gilia spp. (a)	-	$_{b}$160	$_{a}$-	-	72	-	.38	-
F	Hackelia patens	-	4	-	-	2	-	.01	-
F	Lappula occidentalis (a)	-	-	1	-	-	1	-	.00
F	Microsteris gracilis (a)	-	$_{b}$12	$_{a}$-	-	4	-	.02	-
F	Orobanche fasciculata	-	-	1	-	-	1	-	.00
F	Phlox longifolia	-	5	5	-	3	3	.01	.01
F	Plantago patagonica (a)	-	$_{a}$13	$_{b}$52	-	8	18	.04	.38
F	Ranunculus testiculatus (a)	-	$_{a}$12	$_{b}$45	-	8	16	.04	.35
F	Sphaeralcea coccinea	-	6	3	-	2	1	.01	.06
Total Annual Forbs		0	237	103	0	114	38	0.58	0.76
Total Perennial Forbs		0	24	11	0	13	7	0.08	0.11

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 5

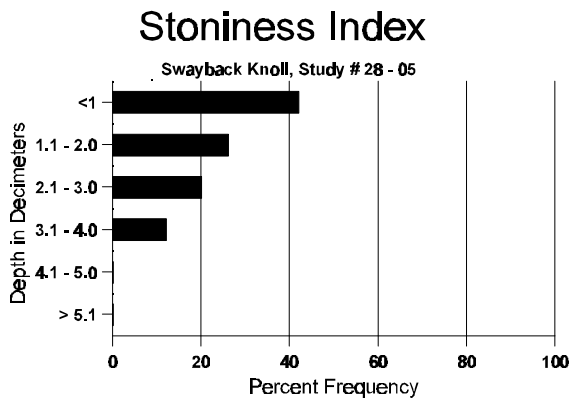
Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Artemisia tridentata wyomingensis	92	92	11.11	12.46
B	Opuntia spp.	16	14	1.25	.59
Total for Browse		108	106	12.36	13.06

BASIC COVER --
Herd unit 28 , Study no: 5

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	110	365	5.00	15.86	34.86
Rock	180	199	9.50	17.97	8.12
Pavement	252	255	39.75	9.97	21.18
Litter	238	380	27.75	22.08	34.52
Cryptogams	8	43	.25	.22	.51
Bare Ground	228	253	17.75	31.76	16.11

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 05, Study Name: Swayback Knoll

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.9	66.0 (12.7)	6.7	49.8	30.4	19.8	1.1	9.7	67.2	.4



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 5

Type	Quadrat Frequency '92	'98
Rabbit	68	18
Elk	-	1
Deer	59	32

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 5

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	6	1	-	-	-	-	-	-	-	7	-	-	-	466			7
	92	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24
	98	27	-	-	-	-	-	-	-	-	27	-	-	-	540			27
Y	87	-	5	8	-	-	-	-	-	-	13	-	-	-	866			13
	92	17	8	7	13	1	-	1	-	-	47	-	-	-	940			47
	98	21	-	3	1	-	-	-	-	-	25	-	-	-	500			25
M	87	1	8	30	-	-	-	-	-	-	36	3	-	-	2600	21	20	39
	92	29	95	36	1	1	-	-	-	-	162	-	-	-	3240	-	-	162
	98	67	61	11	1	-	-	-	-	-	137	2	-	-	2800	21	27	140
D	87	-	4	17	-	-	-	-	-	-	17	1	-	3	1400			21
	92	17	47	20	-	1	1	-	-	-	59	-	13	14	1720			86
	98	14	28	3	-	-	-	-	-	-	38	-	-	7	940			47
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	2	-	-	-	780			39

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	23%	75%	04%	+18%
'92	52%	22%	10%	-28%
'98	42%	08%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	4866	Dec:		29%
'92	5900			29%
'98	4240			22%

Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	5	-	-	-	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	2	-	-	-	-	-	-	-	-	1	1	-	-	133	6	13	2
	92	23	-	-	6	-	-	-	-	-	29	-	-	-	580	-	-	29
	98	15	1	-	-	-	-	-	-	-	16	-	-	-	320	13	34	16
D	87	2	-	-	-	-	-	-	-	-	1	-	-	1	133			2
	92	-	-	-	3	-	-	-	-	-	3	-	-	-	60			3
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	13%	+19%
'92	00%	00%	00%	-45%
'98	06%	00%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	532	Dec:		25%
'92	660			9%
'98	360			6%

Trend Study 28-6-98

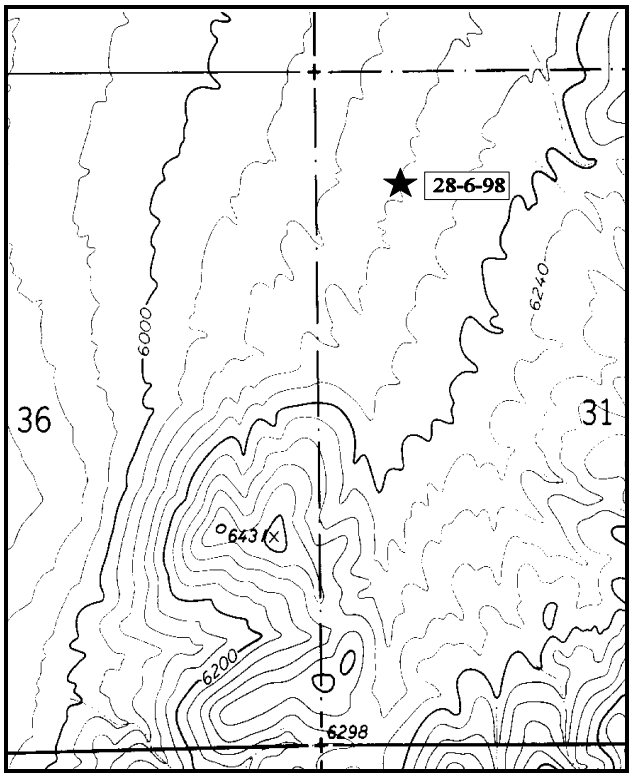
Study site name: Cottonwood . Range type: Chained, Seeded Pinyon-Juniper.

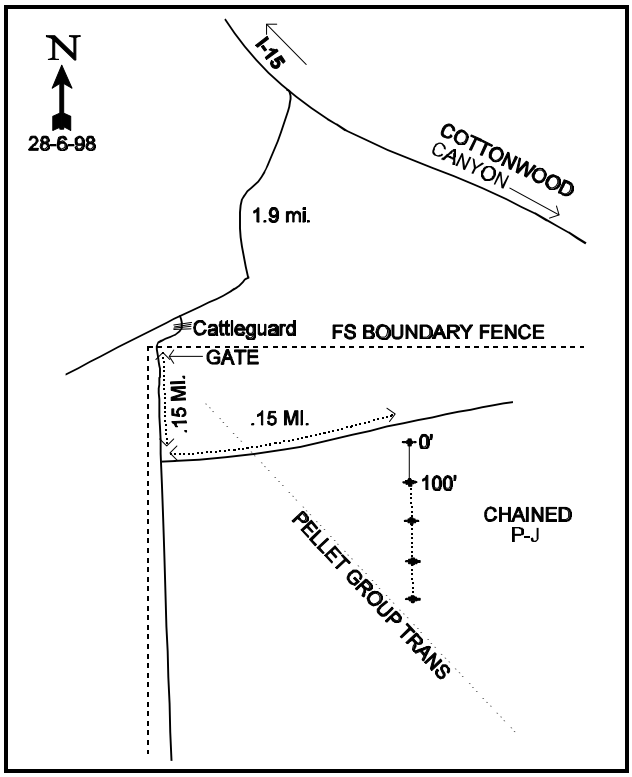
Compass bearing: frequency baseline 180 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the intersection of SR 20 and the frontage road along the east side of I-15, travel south down the frontage road 6.6 miles to a gate on the left. Go through the gate and travel east for 1.9 miles to a cattleguard on the right. From the cattleguard, go 0.15 miles south along the fence. Turn left on an old road going up into the chaining. Continue 0.15 miles to the study site on the south side of the road. The 0-foot baseline stake is 10 paces south of the road. This 2-foot tall fencepost is marked with a browse tag, #9006.





Map Name: Cottonwood Mountain Diagrammatic Sketch

Township 32S , Range 7W , Section 31 UTM 4187912.078 N, 344155.448 E

DISCUSSION

Trend Study No. 28-6 (47-6)

The Cottonwood trend study is located on the critical winter range west of the Hurricane Cliffs and samples a sagebrush area at the mouth of Cottonwood Canyon. The site is just above the Forest Service boundary fence at an elevation of 6,100 feet. Slope is 2-3% with a westerly aspect. The area is part of a large chaining project completed in 1970. The site is now dominated by Wyoming big sagebrush, annual grasses, and annual forbs with few pinyon or juniper trees present on the treatment. In 1992, deer sign was abundant including antler drops, pellet groups, and a carcass. A pellet group transect read in 1998 showed 41 deer days use/acre, 7 elk days use/acre, and 2 cow days use/acre.

The soil is light brown in color with an average effective rooting depth (see methods) of almost 15 inches. Soil textural analysis indicates it to be a sandy loam with a slightly alkaline pH (7.5). Several gullies are found crossing the site, but do not appear to be very active. Erosion currently does not appear to be a problem. Most of the bare ground occurs in the shrub interspaces. Chemical analysis of the soils measured phosphorus at 7.8 ppm, where 10 ppm is considered minimal for normal plant development.

Wyoming big sagebrush is the only browse species of worth on the site. Sagebrush densities have slowly declined from an estimated density of 2,466 plants/acre in 1987, to 1,920 in 1992, and finally 1,560 plants/acre in 1998. Utilization was very high in 1987 when 89% of the sagebrush displayed heavy hedging (>60% of twigs browsed). Although heavily browsed, it appeared vigorous and there was a fair amount of seed production. This heavy use coincides with the high deer populations the unit experienced in the late 1980's. By 1992, utilization was mostly moderate with only 14% of the sagebrush inventoried displaying heavy hedging. Currently, utilization is still moderate with 6% of the plants inventoried displaying heavy utilization. Vigor declined between 1987 and 1992, but is currently similar to that of 1992 at 13%. Percent decadency has slowly increased since 1987 from 8% to 16% in 1992, and to 29% in 1998. Biotic potential is currently fairly good with 140 seedling plants/acre estimated. The only other browse encountered on the site included a few prickly phlox and prickly-pear cactus. Mature stands of pinyon-juniper to the north provide thermal cover. On the site itself, there are only scattered mature trees and a few young ones.

Perennial herbaceous vegetation is limited, but sum of nested frequency is slowly increasing. In 1987, crested wheatgrass was the most frequently encountered perennial grass, with bottlebrush squirreltail also fairly prevalent. By 1992, crested wheatgrass declined in nested frequency while purple three-awn and bottlebrush squirreltail increased significantly. Perennial grass sum of nested frequency has increased from 74 in 1987, to 133 in 1992, and finally 175 in 1998. The dominant grass on the site is cheatgrass. Although annual species were not sampled in 1987, photographs from that year show that cheatgrass was moderately abundant. Since 1992, cheatgrass has significantly increased in nested frequency. Cheatgrass currently provides 66% of the herbaceous understory cover and 52% of the total vegetative cover. This is an increase from the 1992 estimates of providing 45% of the herbaceous understory cover and 29% of the total cover. In the past, forbs consisted primarily of annual species. The only common perennial forb is scarlet globemallow.

1987 APPARENT TREND ASSESSMENT

A concentration of rocks and pavement occurs on the soil surface constituting 23% of the ground cover for the area. Vegetative cover is low and litter cover quite high (64%), most of which is provided by the annual cheatgrass. Although of rather poor quality, ground cover of some kind occurs on all but 9% of the surface. Browse trend is slightly down due to the degree of heavy hedging and lack of seedlings for sagebrush. The herbaceous understory is dominated by ephemeral plants. Perennial forbs are lacking.

1992 TREND ASSESSMENT

Soil conditions appear similar to those of 1987. Using the new cover estimation procedure, rock and pavement cover increased to 31%, litter declined to 26%, while percent bare ground cover increased to 21%. Some of these changes are the result of the new, much larger sampling design. Little erosion occurs on this site due to the nearly continuous cover of rock and pavement. In addition, dead cheatgrass plants provide abundant cover. Trend for soil is stable to slightly down. Wyoming big sagebrush, the only abundant browse species on the site, declined in density since 1987, but this is more reflective of the larger sampling design than any real change in it's density. Percent decadency doubled but is still relatively low at only 16%. The proportion of plants heavily hedged declined from 89% to 14%. Plants were very vigorous this year, producing abundant seed. Overall trend for browse is stable. Nested frequencies for perennial grasses increased while those for forbs declined. Nested frequencies for perennial grasses and forbs combined, remained basically unchanged. Annual grasses and forbs dominate the herbaceous understory. Cheatgrass accounts for 45% of the herbaceous understory cover. Trend for herbaceous understory is stable.

TREND ASSESSMENT
soil - stable to slightly down
browse - stable
herbaceous understory - stable, but dominated by annuals

1998 TREND ASSESSMENT

The soil trend is slightly upward. Even though percent vegetative cover increased, most of the increase is due to the cheatgrass. Although cheatgrass does provide some soil protection, it is not as effective at protecting the soil from overland flow as perennial grasses or forbs. Percent bare ground cover increased slightly while percent rock and pavement cover combined decreased. Erosion is currently minimal, although there are several gullies crossing the site. The browse trend is stable. Although percent decadency for Wyoming big sagebrush has increased since 1987 and 1992, there are currently enough seedling plants in 1998 to make up for the losses. It is a little surprising that any seedling plants were encountered in 1998 at all considering the abundance of cheatgrass. If cheatgrass abundance continues to increase, it will be difficult for seedlings to establish and the possibility of losing the browse population due to a fire event increases. The herbaceous understory is slightly downward. Perennial grasses, although sparse, are still present throughout the site with a slight increase in sum of nested frequency since 1992. The problem lies with cheatgrass. Nested frequency has significantly increased since 1992. The wet spring of 1998 produced high cheatgrass cover values and ample seed for future years.

TREND ASSESSMENT
soil - slightly upward
browse - slightly down with continuing losses to sagebrush, dense understory of fine fuels could eventually be catastrophic resulting in loss of the sagebrush population
herbaceous understory - slightly downward, poor diversity and very abundant cheatgrass

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 6

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Agropyron cristatum	35	22	25	18	11	11	.88	.97
G	Aristida purpurea	$_{a}$8	$_{b}$53	75	3	20	31	3.02	4.52
G	Bouteloua gracilis	3	-	-	1	-	-	-	-
G	Bromus tectorum (a)	-	$_{a}$302	$_{b}$367	-	98	100	8.19	17.91
G	Oryzopsis hymenoides	8	6	8	3	3	4	.07	.10
G	Poa secunda	-	-	1	-	-	1	-	.03
G	Sitanion hystrix	$_{a}$11	$_{b}$46	$_{b}$44	8	20	18	.93	.86
G	Sporobolus cryptandrus	3	-	3	1	-	1	-	.00
G	Stipa comata	$_{ab}$6	$_{a}$6	$_{b}$19	4	3	7	.21	.43
Total Annual Grasses		0	302	367	0	98	100	8.19	17.91
Total Perennial Grasses		74	133	175	38	57	73	5.13	6.93
F	Ambrosia spp.	-	5	-	-	3	-	.01	-
F	Astragalus panguicensis	2	-	-	1	-	-	-	-
F	Chaenactis douglasii	-	-	1	-	-	1	-	.00
F	Chenopodium spp. (a)	-	3	-	-	1	-	.00	-
F	Descurainia spp. (a)	-	$_{b}$42	$_{a}$-	-	25	-	1.47	-
F	Eriogonum cernuum (a)	-	6	-	-	3	-	.04	-
F	Erigeron spp.	-	-	2	-	-	2	-	.01
F	Euphorbia fendleri	90	-	-	36	-	-	-	-
F	Gilia spp. (a)	-	$_{b}$112	$_{a}$-	-	47	-	.66	-
F	Ipomopsis aggregata	-	3	-	-	1	-	.00	-
F	Leptodactylon pungens	-	2	-	-	1	-	.15	-
F	Polygonum spp.	-	3	-	-	2	-	.01	-
F	Senecio multilobatus	-	2	-	-	1	-	.00	-
F	Sphaeralcea coccinea	$_{a}$71	$_{b}$103	$_{b}$125	26	39	47	2.59	2.29
Total Annual Forbs		0	163	0	0	76	0	2.17	0
Total Perennial Forbs		163	118	128	63	47	50	2.80	2.31

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 6

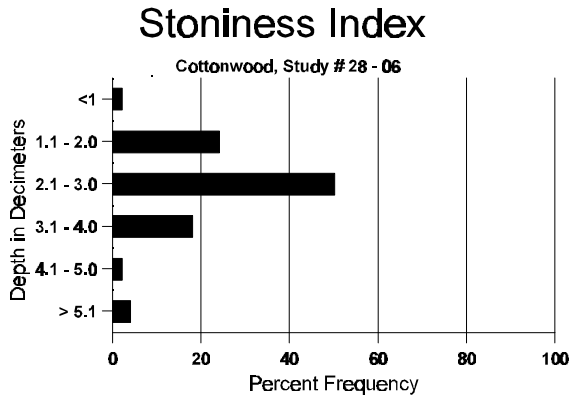
Type	Species	Strip Frequency '92	Strip Frequency '98	Average Cover % '92	Average Cover % '98
B	Artemisia tridentata wyomingensis	50	46	9.88	7.56
B	Juniperus osteosperma	0	0	-	-
B	Leptodactylon pungens	3	1	-	.03
B	Opuntia spp.	2	1	.00	-
Total for Browse		55	48	9.88	7.59

BASIC COVER --
Herd unit 28 , Study no: 6

Cover Type	Nested Frequency '92	Nested Frequency '98	Average Cover % '87	Average Cover % '92	Average Cover % '98
Vegetation	45	373	3.25	24.97	34.35
Rock	93	167	12.75	5.65	4.45
Pavement	233	296	10.50	24.90	16.75
Litter	217	387	64.25	25.82	38.24
Cryptogams	-	16	0	.01	.24
Bare Ground	151	288	9.25	21.09	23.68

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 06, Study Name: Cottonwood

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.8	60.0 (15.6)	7.5	61.4	20.4	18.2	1.3	7.8	147.2	.5



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 6

Type	Quadrat Frequency '92	'98
Rabbit	61	38
Elk	-	1
Deer	57	47
Cattle	2	-

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	6	-	-	-	-	-	1	-	-	7	-	-	-	140			7
Y	87	-	1	6	-	-	-	-	-	-	7	-	-	-	466			7
	92	1	3	-	1	-	-	-	-	-	5	-	-	-	120			6
	98	2	2	-	1	-	-	-	-	-	5	-	-	-	100			5
M	87	-	3	24	-	-	-	-	-	-	27	-	-	-	1800	23	29	27
	92	19	41	13	1	1	-	-	-	-	72	-	3	-	1500	-	-	75
	98	16	33	-	1	-	-	-	-	-	47	-	3	-	1000	26	37	50
D	87	-	-	3	-	-	-	-	-	-	2	-	-	1	200			3
	92	3	10	-	2	-	-	-	-	-	5	-	4	6	300			15
	98	3	15	5	-	-	-	-	-	-	15	1	2	5	460			23
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	340			17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	11%	89%	03%	-22%
'92	57%	14%	14%	-19%
'98	64%	06%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	2466	Dec:	8%
	'92	1920		16%
	'98	1560		29%

Juniperus osteosperma																		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	0		-
	'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	10	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	-67%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	60		-
	'98	20		-

Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	9	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	-50%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	40		-
	'98	20		-

Trend Study 28-7-98

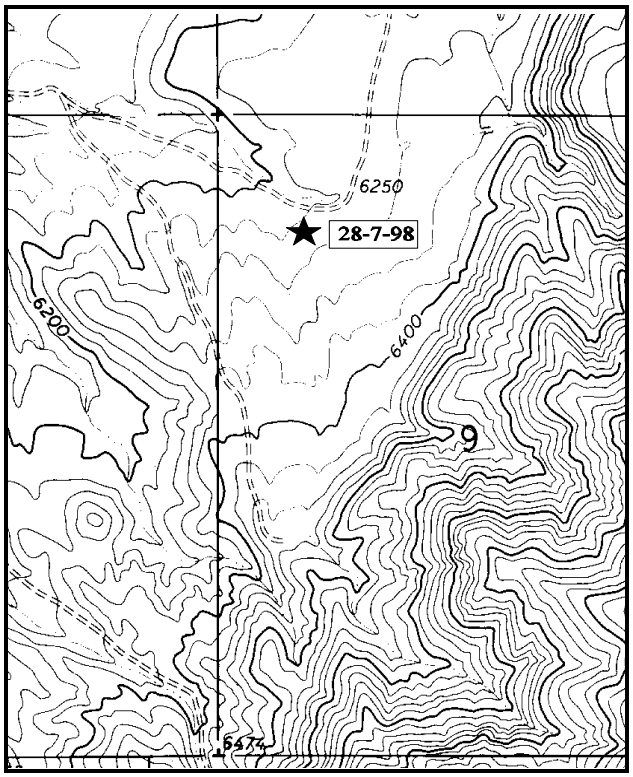
Study site name: Paragonah . Range type: Chained, Seeded P-J .

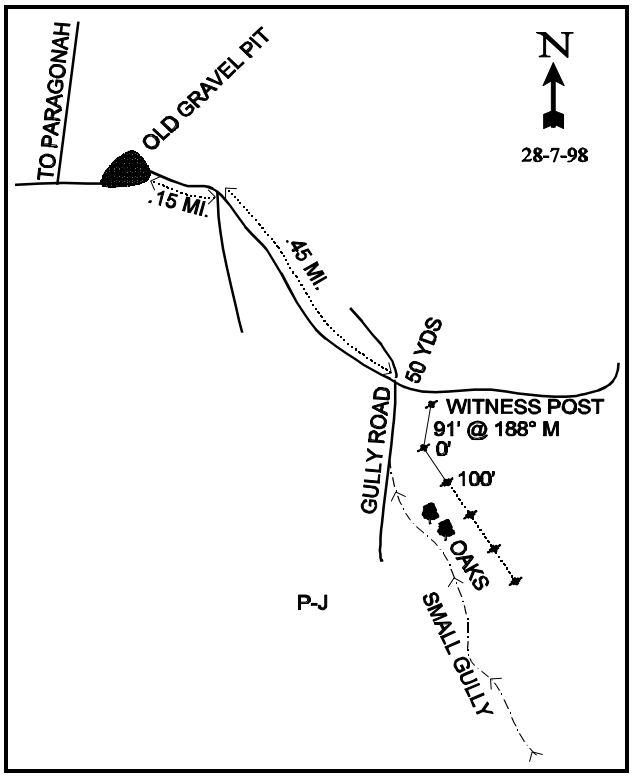
Compass bearing: frequency baseline 147 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From Center Street in Paragonah, follow Main Street south for 0.45 miles to an intersection. Turn left and go 0.30 miles to a gate and fork. Turn left and proceed 0.65 miles. Turn left and go to the top of an old gravel pit. From the top east edge of the gravel pit, go 0.15 miles to a fork. Take the left fork, and go 0.45 miles to a large gully where there used to be a road. Continue on the road across the gully for approximately 50 yards to a witness post (4' fencepost) on the right side of the road. The baseline starts 92 feet at 188°M from the witness post. The study is marked by short fenceposts. * *NOTE-Witness post was missing in 1992.





Map Name: Parowan Diagrammatic Sketch

Township 34S , Range 8W , Section 9 UTM 4192157.719 N, 344155.448 E

DISCUSSION

Trend Study No. 28-7 (47-7)

The Paragonah trend study is located in an old chained and seeded pinyon-juniper area on critical winter range for deer. Elevation is 6,200 feet with northwest aspect. The site slopes away from the cliffs and towards the fields at the base of the bench. Aspect is northwest with a gradual (5-10%) slope. There continues to be considerable regrowth of the pinyon and juniper on this site. A pellet group transect read in 1998 shows 23 deer days use/acre on the site.

Soil textural analysis indicates a sandy loam with a slightly acidic pH (6.3). Rock and pavement are scattered throughout the site on the soil surface and throughout the soil profile. The average effective rooting depth (see methods) is almost 11 inches with a rocky horizon encountered at a depth of 6 to 8 inches. Chemical analysis measured phosphorus at 6.0 and potassium at 3.2 ppm, both of which could limit plant development. Bare areas continue to be subjected to sheet erosion and runoff has formed various size gullies throughout the site. During the 1992 and 1998 surveys, some soil movement was noticeable and several old gullies were noted. Vegetation and litter cover left from the chaining process helps to stabilize the soil.

Nine species of shrubs occur on the site, but only black sagebrush, broom snakeweed, and Gambel oak are abundant. Black sagebrush had a density of 3,665 plants/acre in 1987, increasing to 4,300 in 1992 and then dropping to 2,540 plants/acre in 1998. Utilization was heavy in 1987 when 76% of the shrubs displayed heavy use. In 1992, only 22% of the sagebrush was heavily hedged, and in 1998 the population exhibited light utilization. Vigor has been good over all years. Age class analysis would indicate a slightly decreasing population. The biotic potential has declined since 1992, and will not replace plants that are being lost. Percent decadency was 7% in 1987, increasing to 29% in 1992, and then declined to 20% in 1998. Small numbers of mountain big sagebrush also occur on the site. In 1998, mountain big sagebrush density was estimated to be 240 plants/acre.

Broom snakeweed was the most abundant shrub in the past with an estimated density of 7,932 plants/acre in 1987, yet down to 4,320 in 1992. Currently, the density is estimated to be 1,320 plants/acre. Even with this decline, a large portion of the population (30%) is made up of young plants. Gambel oak was found in increasing numbers in 1992, but has since dropped to 1,020 plants/acre in 1998. Canopy cover for oak in 1998 is estimated to be 6%. The increased sample size, which was used beginning in 1992, picked up additional shrub species which now includes: brickellbush, rubber rabbitbrush, and slenderbush eriogonum.

Pinyon and juniper, although not numerous, figure prominently in the vegetative structure of this site. Density plots estimated 199 trees per acre in 1987. During the 1992 reading, point quarter data estimated 241 pinyon trees/acre and 35 juniper for a total of 276 trees/acre. Most of the trees were in the 4 to 8 foot category. Currently, point-centered quarter data indicates 49 Utah juniper trees/acre and 71 pinyon pine trees/acre for a total of 120 trees/acre. Canopy cover in 1998 is estimated to be 4% for Utah juniper and 19% for pinyon pine. Together, 23% canopy cover by the pinyon and juniper trees would depress the understory production by at least 50%.

The herbaceous understory is dominated by a patchy stand of crested wheatgrass and intermediate wheatgrass. Nested frequency for both grasses declined significantly in 1992. Intermediate wheatgrass nested frequency has significantly increased since 1992 and is now similar to that recorded in 1987. Cheatgrass nested frequency has also significantly increased since 1992 and currently accounts for 27% of the herbaceous understory cover. Perennial grass sum of nested frequency has increased from 189 in 1992 to 263 in 1998, but this is still lower then the initial reading of 294 in 1987. Perennial forbs are diverse but are rarely encountered. The only common forb encountered during any year was the prostrate fendler spurge. Perennial forb sum of nested frequency has decreased since 1992.

1987 APPARENT TREND ASSESSMENT

The percentage of erosion pavement covering the ground surface is very high (27%). Rocks are also common. Where shrubs and grasses occur, litter has accumulated providing excellent soil protection. However, plants are scattered; and consequently, the percent cover provided by vegetation and litter is only 44%. Bare soil is exposed on 15% of the ground surface and there is plenty of evidence of soil loss. Most erosion took place gradually over time and likely prior to the chaining treatment. The preferred browse species, black sagebrush, and mountain big sagebrush, have been heavily hedged but display good vigor with an adequate amount of seedlings and young. The abundance of broom snakeweed is a negative factor that should be closely monitored.

1992 TREND ASSESSMENT

Looking at the data and photos, it appears that herbaceous ground cover has declined slightly while bare ground has increased. Most open areas are still covered by a nearly continuous layer of rock and pavement. Even though some soil movement is detectable, erosion is not presently a problem on this site, but the potential is still present especially if there is further loss of the herbaceous understory. Trend for soil is down slightly. The key browse on the site consist of black sagebrush, mountain big sagebrush, and oak. Trend for all these species is stable with increased densities, good vigor, and less heavy hedging, but increased decadence for black sagebrush which makes up the majority of the preferred browse. Broom snakeweed also declined significantly. The only negative factor is the increase in pinyon and juniper trees which are regaining dominance of the site. With that in mind, the overall browse trend is slightly up. The herbaceous component consists primarily of two seeded grasses which declined in nested and quadrat frequencies since the last reading. The increase in the summed nested frequencies of forbs is likely the result of the increased sample size which picked up an additional six perennial forbs. Grass and forb summed nested frequencies combined declined since 1987 indicating a downward trend.

TREND ASSESSMENT
soil - slightly down
browse - stable, dominant browse has increased density, but also four times higher rate of decadency
herbaceous understory - down

1998 TREND ASSESSMENT

The soil trend is upward with an increase in percent vegetation and litter cover and a decease in percent bare ground. Erosion potential has decreased with an increase in protective ground cover. Some slight soil erosion is apparent, but not excessive. The browse trend is down. Utilization is currently light with the percentage of plants in poor vigor remaining low over all years. However, the population of black sagebrush has decreased by 40% and the number of seedling and young plants are not adequate to replace the lost plants in the population. The herbaceous understory trend is stable with a slight increase in perennial herbaceous understory sum of nested frequency. Cheatgrass sum of nested frequency increased significantly since 1992 and currently accounts for 27% of the total herbaceous understory cover. Crested wheatgrass and intermediate wheatgrass are the dominate perennial species contributing 55% of the herbaceous understory cover combined.

TREND ASSESSMENT
soil - upward
browse - down
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 7

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Agropyron cristatum	$_{b}$211	$_{a}$146	$_{ab}$154	79	59	55	3.39	4.71
G	Agropyron intermedium	$_{b}$58	$_{a}$27	$_{b}$59	23	12	29	.49	2.13
G	Agropyron smithii	-	-	3	-	-	1	-	.00
G	Agropyron trachycaulum	-	-	8	-	-	3	-	.02
G	Bromus tectorum (a)	-	45	219	-	22	71	.33	3.40
G	Oryzopsis hymenoides	10	8	5	6	4	3	.07	.18
G	Poa secunda	$_{a}$2	$_{a}$3	$_{b}$24	1	1	9	.00	.19
G	Sitanion hystrix	$_{b}$13	$_{a}$-	$_{ab}$7	7	-	5	.00	.19
G	Stipa comata	-	-	3	-	-	1	-	.00
Total Annual Grasses		0	45	219	0	22	71	0.33	3.4
Total Perennial Grasses		294	229	482	116	98	177	4.30	10.87
F	Alyssum alyssoides (a)	-	$_{a}$-	$_{b}$7	-	-	4	-	.02
F	Arabis spp.	-	3	-	-	1	-	.00	-
F	Artemisia dracunculus	-	-	4	-	-	2	-	.03
F	Astragalus lentiginosus	-	2	-	-	2	-	.01	-
F	Astragalus newberryi	1	4	3	1	2	2	.01	.01
F	Eriogonum cernuum (a)	-	2	-	-	1	-	.00	-
F	Erigeron pumilus	10	10	4	7	4	2	.04	.01
F	Eriogonum racemosum	-	1	-	-	1	-	.00	-
F	Eriogonum umbellatum	5	1	3	2	1	2	.03	.01
F	Euphorbia fendleri	$_{b}$80	$_{ab}$75	$_{a}$55	39	32	24	1.12	.88
F	Lactuca serriola	-	1	6	-	1	4	.00	.02
F	Leucelene ericoides	-	12	8	-	5	3	.22	.30
F	Lepidium spp. (a)	-	3	-	-	1	-	.00	-
F	Lithospermum ruderale	-	13	-	-	8	-	.06	-
F	Lithophragma	-	-	2	-	-	1	-	.15
F	Machaeranthera canescens	3	3	-	1	1	-	.03	-
F	Penstemon eatoni	-	-	-	-	-	-	-	.00
F	Petradoria pumila	1	-	-	1	-	-	-	-
F	Phlox longifolia	-	-	7	-	-	3	-	.01
F	Ranunculus testiculatus (a)	-	18	7	-	8	5	.09	.02
F	Senecio douglasii	2	-	-	2	-	-	-	-
F	Sphaeralcea coccinea	$_{a}$-	$_{b}$10	$_{ab}$2	-	5	1	.19	.03
F	Streptanthus cordatus	3	9	10	2	4	4	.31	.09
F	Tragopogon dubius	1	-	-	1	-	-	-	-
F	Unknown forb-perennial	24	-	-	11	-	-	-	-
Total Annual Forbs		0	23	14	0	10	9	0.09	0.04
Total Perennial Forbs		130	144	104	67	67	48	2.06	1.57

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 7

Type	Species	Strip Frequency '92	Strip Frequency '98	Average Cover % '92	Average Cover % '98
B	Artemisia nova	59	50	4.31	5.88
B	Artemisia tridentata vaseyana	7	8	.03	.15
B	Brickellia spp.	1	0	-	-
B	Chrysothamnus nauseosus	1	2	.00	-
B	Eriogonum microthecum	12	4	1.05	.07
B	Gutierrezia sarothrae	49	30	1.46	.79
B	Juniperus osteosperma	4	2	1.92	1.25
B	Leptodactylon pungens	11	7	.27	.39
B	Opuntia spp.	2	2	.03	.04
B	Pinus edulis	13	14	8.71	9.66
B	Pinus edulis chained	0	0	-	-
B	Quercus gambelii	8	7	4.50	4.65
Total for Browse		167	126	22.31	22.91

CANOPY COVER --
Herd unit 28 , Study no: 7

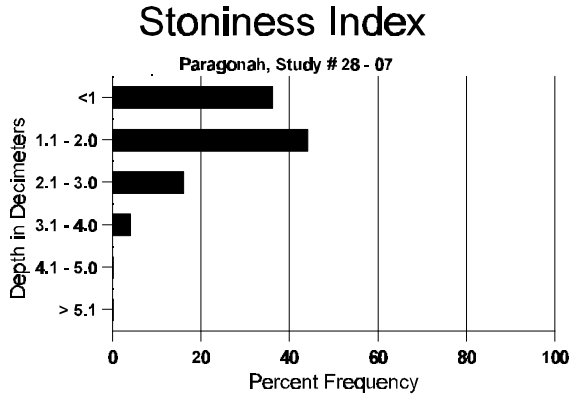
Species	Percent Cover '98
Juniperus osteosperma	4
Pinus edulis	19
Quercus gambelii	6

BASIC COVER --
Herd unit 28 , Study no: 7

Cover Type	Nested Frequency '92	Nested Frequency '98	Average Cover % '87	Average Cover % '92	Average Cover % '98
Vegetation	52	328	2.75	25.71	35.17
Rock	142	204	12.25	29.99	9.75
Pavement	190	275	27.00	0	18.49
Litter	228	391	43.50	34.60	47.87
Cryptogams	54	119	0	2.03	2.18
Bare Ground	148	230	14.50	24.43	17.53

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 07, Study Name: Paragonah

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.9	62.4 (15.1)	6.3	65.4	20.4	14.2	2.2	6.0	3.2	.4



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 7

Type	Quadrat Frequency '92	'98
Sheep	2	-
Rabbit	84	56
Elk	-	1
Deer	26	28

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 7

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	87	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	92	19	-	-	3	-	-	-	-	-	22	-	-	-	440			22
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	87	4	2	1	-	-	-	-	-	-	7	-	-	-	466			7
	92	15	21	6	-	-	-	-	-	-	42	-	-	-	840			42
	98	19	5	-	-	-	-	-	-	-	24	-	-	-	480			24
M	87	-	4	40	-	-	-	-	-	-	44	-	-	-	2933	10	18	44
	92	21	58	30	-	1	-	-	-	-	110	-	-	-	2200	-	-	110
	98	67	6	-	5	-	-	-	-	-	78	-	-	-	1560	11	21	78
D	87	3	-	1	-	-	-	-	-	-	3	-	-	1	266			4
	92	15	34	12	1	1	-	-	-	-	60	-	3	-	1260			63
	98	20	5	-	-	-	-	-	-	-	21	-	-	4	500			25
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	11%	76%	02%	+15%
'92	53%	22%	01%	-41%
'98	13%	00%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	3665	Dec:	7%
	'92	4300		29%
	'98	2540		20%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	3	1	-	-	-	-	-	-	5	-	-	-	100	-	-	5
	98	5	1	-	-	-	-	-	-	-	6	-	-	-	120	14	26	6
D	87	-	-	1	-	-	-	-	-	-	-	1	-	-	66			1
	92	2	-	1	-	-	-	-	-	-	3	-	-	-	60			3
	98	1	2	-	-	-	-	-	-	-	3	-	-	-	60			3
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	100%	00%	+29%
'92	21%	14%	00%	-14%
'98	25%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	199	Dec:	33%	
'92	280		21%	
'98	240		25%	

Brickellia spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	-
'92	20		-
'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	12	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	+50%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	20			-
'98	40			-

Eriogonum microthecum																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	5	1	-	-	-	-	-	-	-	6	-	-	-	120			6
	98	2	-	2	-	-	-	-	-	-	2	-	-	2	80			4
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	18	-	2	-	-	-	-	-	-	20	-	-	-	400	-	-	20
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	11	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	04%	08%	00%	-73%
'98	00%	29%	29%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		0%
'92	520			0%
'98	140			14%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	87	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	92	80	-	-	2	-	-	-	-	-	82	-	-	-	1640			82
	98	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
M	87	109	-	-	-	-	-	-	-	-	109	-	-	-	7266	8	5	109
	92	131	-	-	2	-	-	-	-	-	133	-	-	-	2660	-	-	133
	98	45	-	-	-	-	-	-	-	-	44	-	-	1	900	9	9	45
D	87	4	-	-	-	-	-	-	-	-	1	-	-	3	266			4
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	03%	-46%
'92	00%	00%	00%	-69%
'98	00%	00%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	7932	Dec:	3%
	'92	4320		0%
	'98	1320		2%

Juniperus osteosperma																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	3	-	-	1	-	-	4	-	-	-	80	-	-	4
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	-50%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	80		-
	'98	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
Y	87	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	13	-	-	-	-	-	-	-	-	1	-	12	-	866	3	5	13
	92	18	1	-	7	-	-	-	-	-	26	-	-	-	520	-	-	26
	98	15	-	-	-	-	-	-	-	-	15	-	-	-	300	7	12	15
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	93%	-36%
'92	03%	00%	00%	-40%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	932	Dec:	0%
	'92	600		0%
	'98	360		6%

Opuntia spp.																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	1	-	-	-	-	-	-	-	-	-	-	1	-	66	2	8	1
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	1	-	-	-	-	-	-	-	-	-	-	1	-	20	5	9	1
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	100%	+34%
'92	00%	00%	20%	-40%
'98	00%	00%	67%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	0%
	'92	100		20%
	'98	60		33%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	11	-	-	-	-	-	1	-	-	12	-	-	-	240			12
	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	98	57	2
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160	-	-	8
	98	10	-	-	1	-	-	-	-	-	11	-	-	-	220	-	-	11
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+67%
'92	00%	00%	00%	-25%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	133	Dec:	-
	'92	400		-
	'98	300		-

Pinus edulis chained																			
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	59	26	1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'92	0		-
	'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	19	-	-	1	-	-	-	-	-	20	-	-	-	400			20
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	92	36	6	18	33	-	-	-	-	-	93	-	-	-	1860			93
	98	27	-	-	-	-	-	5	-	-	32	-	-	-	640			32
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	1	-	-	-	9	16	-	18	-	8	-	520	-	-	26
	98	-	-	-	1	-	-	-	18	-	19	-	-	-	380	87	29	19
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	6	4	-	-	-	-	-	-	9	3	-	-	240			12
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+92%
'92	09%	18%	06%	-61%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	200	Dec:		0%
'92	2620			9%
'98	1020			0%

Trend Study 28-8-98

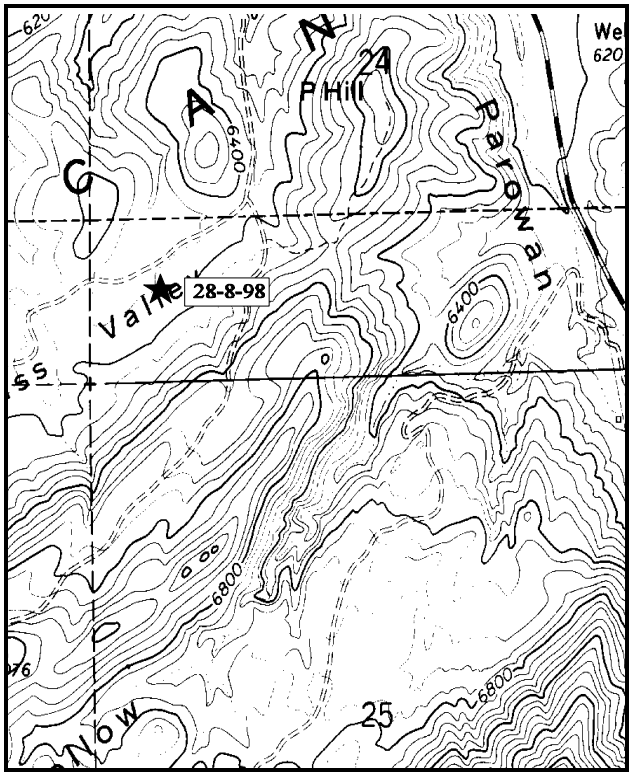
Study site name: Grass Valley . Range type: Big Sagebrush .

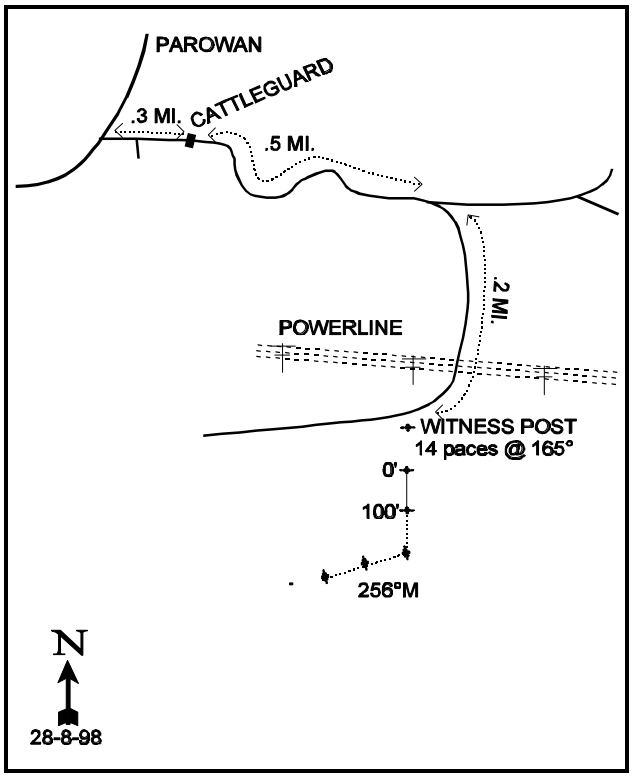
Compass bearing: frequency baseline 165 M degrees, lines 3-4, 256 M degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From I-15 take the north Parowan exit south into town. Continue down Main Street to a big gradual curve on south end of town. Turn east off the highway across from a log house onto a dirt road, go past other houses staying on the main road 0.3 miles to cattleguard. From the cattleguard, continue 0.5 miles to a fork. Bear right. Proceed 0.2 miles, under powerlines to a witness post on left side of the road. The baseline starts 68 feet at a bearing of 165° M, and is marked by 2-foot tall fenceposts with no browse tag. Line-intercept transect 57B-1-78 is located 0.4 miles further down the road.





Map Name: Parowan

Diagrammatic Sketch

Township 34S , Range 9W , Section 24

UTM 4187912.078 N, 339118.518 E

DISCUSSION

Trend Study No. 28-8 (47-8)

The Grass Valley trend study is located in the foothills south of Parowan. Elevation is approximately 6,400 feet with a northeast aspect and gentle 5% slope. The site is surrounded by pinyon-juniper covered hills. Most of the valley was chained and seeded in the mid-1960's by the BLM. The site itself is dominated by Wyoming big sagebrush and seeded grasses and is considered critical deer winter range. A pellet group transect read in conjunction with the vegetative baseline in 1998 showed 61 deer days use/acre, almost 1 elk days use/acre, and 9 cow days use/acre. Approximately three-tenths of a mile west of the site is a three-way exclosure which was built in the late 1970's.

Soil textural analysis indicates a sandy loam with a slightly acidic pH (6.4). The average effective rooting depth (see methods) is almost 16 inches with a layer of rocks encountered between 4 and 8 inches below the soil surface. Chemical analysis measured phosphorus at 9.4 ppm; this low of a value may be limiting to plant development. The soil surface in the shrub interspaces is characterized by bare patches with concentrations of small rocks and pavement that appear to be of volcanic origin. Further erosion does not appear to be a problem on this site for most of the surface soils have been lost many years ago, although some seasonal disturbance is evident.

Wyoming big sagebrush is the dominant browse which had an average cover of nearly 17% in 1992. In 1987, density was estimated to be 5,533 plants/acre with 51% of the sagebrush classified as decadent. Utilization was heavy with 80% of the shrubs displaying heavy hedging. By 1992 with the enlarged sampling design, the sagebrush density was estimated at 4,480 plants/acre. A more critical aspect of the population is that percent decadency increased to 60% with 18% of the decadent shrubs classified as dying. Utilization in 1992 was lighter however, with only 40% of the shrubs being heavily hedged. In 1998, the estimated density declined further down to 3,460 plants/acre. Although percent decadency has improved since 1992, it is still high and data would indicate that plants will continue to die. Currently, 24% of the population is dead.

Pinyon and juniper trees are more prominent as you move south toward the hills. Point-centered quarter data indicates 20 pinyon pine trees/acre and 40 Utah juniper trees/acre in 1998. The only other browse species consisted of a few individuals of threadleaf low rabbitbrush, prickly phlox, and prickly-pear cactus. Bitterbrush and squaw-apple are scattered throughout the site.

Perennial grasses are relatively abundant. Two seeded species, crested wheatgrass and slender wheatgrass, are the most common grasses. Cheatgrass nested frequency has significantly increased since 1992, but cover values have changed very little. Perennial forbs are nearly nonexistent. Total cover contributed by forbs is <1%.

1987 APPARENT TREND ASSESSMENT

Ground cover percentages are typical for this type of site. Litter cover is good and combined with basal vegetation provides almost 60% of the total cover. Pavement and small rocks contribute prominently in the open areas. Exposed soil accounts for 17% of the ground surface and presents an erosion problem only in some of the larger bare areas. Heavy use, high decadency, and low biotic and reproductive potentials are a concern for Wyoming big sagebrush. This population will continue to decline. Grasses are adequately established but forbs are basically absent.

1992 TREND ASSESSMENT

Soil conditions appear stable. Some seasonal erosion is still occurring but it is not serious. Wyoming big sagebrush has declined in density by 19%. It is also showing increased percent decadency. On the positive side, the proportion of plants displaying heavy hedging declined from 80% in 1987 to 40% in 1992. The population appears to be slowly declining with a low biotic and reproductive potential of 12%. Overall browse trend is slightly down. The herbaceous understory consists almost entirely of grasses. Perennial forbs are nearly absent. Combined summed nested frequencies of grasses and forbs (excluding the annuals which were not counted in 1987) have remained basically unchanged since the last reading indicating a stable trend.

TREND ASSESSMENT
soil - stable
browse - slightly down
herbaceous understory - stable, but lacking perennial forbs

1998 TREND ASSESSMENT

The soil trend is slightly up with an increase in vegetation and litter cover. Although percent bare ground cover has slightly increased, the vegetative and litter cover are still adequate to protect the area from extensive runoff. The browse trend is continuing downward, but slower at this time. The population has declined by 23% since 1992. It appears that the population may not be able to sustain itself at current levels. The herbaceous understory trend is slightly upward. Perennial herbaceous species sum of nested frequency has increased slightly since 1992 from 403 to 443. One positive aspect is continued high cover values for crested wheatgrass and slender wheatgrass. These relatively higher cover values will help keep cheatgrass in check. Although cheatgrass nested frequency significantly increased, the cover values stayed nearly the same.

TREND ASSESSMENT
soil - slightly upward
browse - down slightly, the Wyoming big sagebrush population continues to decline, but more slowly at this time
herbaceous understory - slightly upward

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Agropyron cristatum	$_{b}$144	$_{a}$111	$_{ab}$130	62	43	44	6.79	10.10
G	Agropyron intermedium	$_{a}$-	$_{b}$25	$_{b}$11	-	10	6	1.83	.25
G	Agropyron trachycaulum	133	143	111	51	47	39	6.19	4.85
G	Aristida purpurea	-	-	-	-	-	-	-	.15
G	Bromus inermis	21	16	18	10	6	7	.25	.21
G	Bromus tectorum (a)	-	$_{a}$124	$_{b}$194	-	45	72	2.26	2.14
G	Oryzopsis hymenoides	6	9	5	2	3	2	.21	.04
G	Poa bulbosa	$_{a}$-	$_{b}$7	$_{c}$77	-	5	29	.10	1.10
G	Poa secunda	-	4	12	-	3	4	.02	.07
G	Sitanion hystrix	29	46	56	14	22	26	1.90	2.02

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Stipa comata	$_{b}$53	$_{ab}$30	$_{a}$13	24	13	6	.69	.72
Total Annual Grasses		0	124	194	0	45	72	2.26	2.14
Total Perennial Grasses		386	515	627	163	197	235	20.27	21.69
F	Alyssum alyssoides (a)	-	-	1	-	-	1	-	.00
F	Astragalus spp.	-	-	4	-	-	2	-	.06
F	Chaenactis douglasii	1	-	2	1	-	2	-	.01
F	Cruciferae	-	9	4	-	3	2	.04	.01
F	Draba spp. (a)	-	-	1	-	-	1	-	.00
F	Eriogonum cernuum (a)	-	6	-	-	3	-	.39	-
F	Microsteris gracilis (a)	-	$_{a}$-	$_{b}$8	-	-	4	-	.02
F	Orobanche fasciculata	-	-	2	-	-	1	-	.00
F	Polygonum douglasii (a)	-	1	4	-	1	2	.00	.01
F	Ranunculus testiculatus (a)	-	$_{a}$-	$_{b}$12	-	-	6	-	.03
F	Taraxacum officinale	-	3	1	-	1	1	.00	.00
F	Unknown forb-annual	-	$_{b}$40	$_{a}$-	-	17	-	.11	-
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total Annual Forbs		0	7	26	0	4	14	0.39	0.06
Total Perennial Forbs		2	52	13	2	21	8	0.16	0.09

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 8

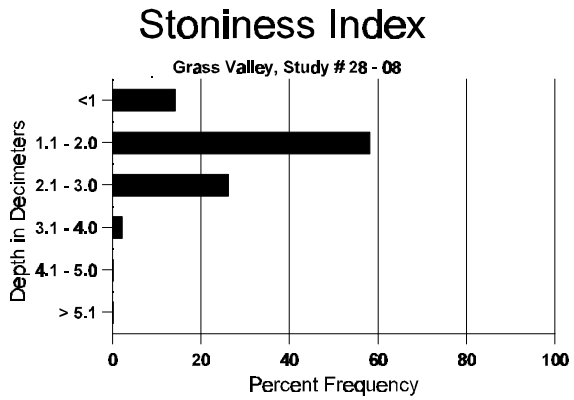
Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Artemisia tridentata wyomingensis	90	85	16.55	13.69
B	Chrysothamnus viscidiflorus stenophyllus	1	0	.00	-
B	Juniperus osteosperma	0	2	.03	.93
B	Leptodactylon pungens	11	7	.25	.27
B	Opuntia spp.	3	0	-	-
B	Peraphyllum ramosissimum	0	1	-	-
Total for Browse		105	95	16.84	14.90

BASIC COVER --
Herd unit 28 , Study no: 8

Cover Type	Nested Frequency		Average Cover %		
	'92	'98	'87	'92	'98
Vegetation	114	326	4.75	32.46	37.59
Rock	23	130	3.00	1.86	3.20
Pavement	166	285	21.25	23.52	20.40
Litter	257	380	54.25	31.47	48.00
Cryptogams	-	40	0	.16	.47
Bare Ground	154	249	16.75	16.85	21.84

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 08, Study Name: Grass Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.9	58.6 (15.6)	6.4	60.7	20.7	18.6	1.7	9.4	192.0	.4



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 8

Type	Quadrat Frequency	
	'92	'98
Sheep	-	1
Rabbit	-	48
Deer	-	46
Cattle	-	3

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 8

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	10	-	-	1	-	-	1	-	-	8	-	4	-	240			12
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	87	-	2	1	-	-	-	-	-	-	3	-	-	-	200			3
	92	6	3	-	6	-	-	-	-	-	14	-	1	-	300			15
	98	9	5	1	1	-	-	-	-	-	16	-	-	-	320			16
M	87	-	10	28	-	-	-	-	-	-	38	-	-	-	2533	20	20	38
	92	11	42	19	2	-	-	-	-	-	74	-	-	-	1480	-	-	74
	98	50	44	4	-	-	-	-	-	-	98	-	-	-	1960	25	35	98
D	87	-	5	37	-	-	-	-	-	-	33	-	3	6	2800			42
	92	16	40	69	2	6	2	-	-	-	97	3	11	24	2700			135
	98	24	32	-	3	-	-	-	-	-	49	-	-	8	1180			59
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1080			54

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	20%	80%	11%	-19%
'92	41%	40%	16%	-23%
'98	47%	03%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	5533	Dec:		51%
'92	4480			60%
'98	3460			34%

Chrysothamnus viscidiflorus stenophyllus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	-
'92	20		-
'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	1	-	-	2	-	-	-	40			2
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	57	39	1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	-	-	-	-	-	-	1	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'92	0		-
	'98	40		-

Leptodactylon pungens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	28	5	4	1	-	-	-	-	-	36	-	2	-	760	-	-	38
	98	15	-	-	1	-	-	-	-	-	16	-	-	-	320	6	9	16

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	11%	09%	04%	-65%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	920		-
	'98	320		-

Opuntia spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	60		-
	'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Peraphyllum ramosissimum																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20	25	22	1
D	87	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'87	00%	100%	00%
'92	00%	00%	00%
'98	00%	100%	00%

Total Plants/Acre (excluding Dead & Seedlings)			%Change	
	'87	133	Dec:	100%
	'92	0		0%
	'98	20		0%

Trend Study 28-9-98

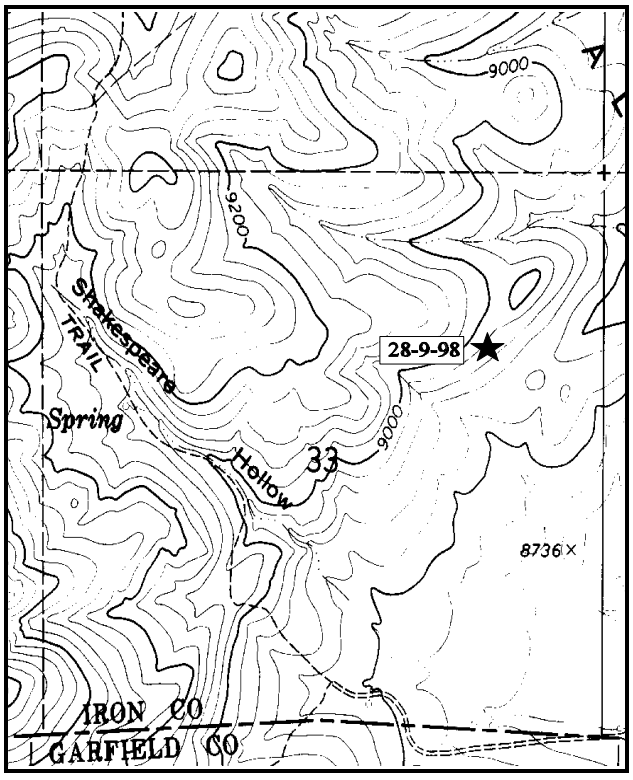
Study site name: Little Valley . Range type: Quaking Aspen .

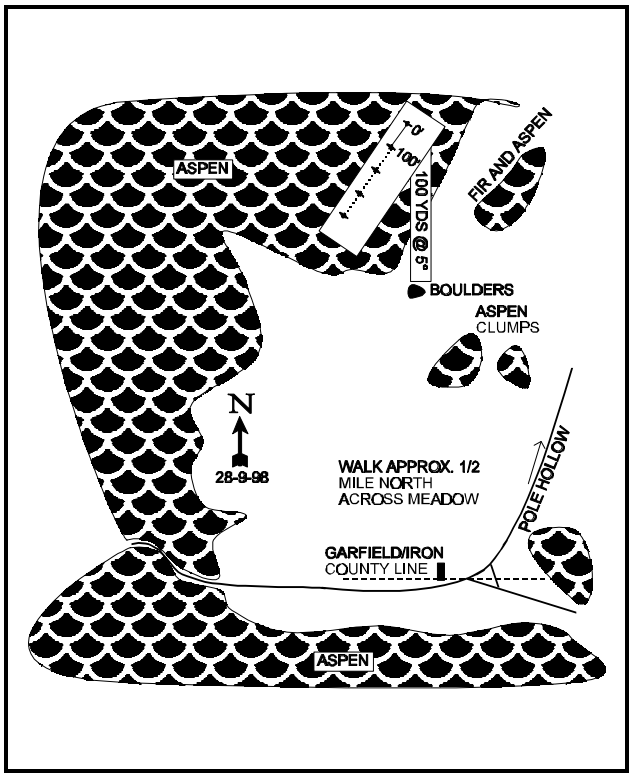
Compass bearing: frequency baseline 195 M degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From Panguitch, go south towards Panguitch Lake. At mile marker 41, turn right onto a dirt road. Proceed up Pole Hollow 4.3 miles to the Five Mile Ridge Road. Continue straight 1.9 miles to a cattleguard. Continue 0.5 miles to a cattleguard and stockpond. Continue 1 mile to another cattleguard. Go 0.4 miles to a fork at the Iron County-Garfield County line. Bear right, go 50 yards, and park. The study is located on the hill to the northwest, so you must hike about 3/4 mile across the meadow, then up towards the aspens. Take a bearing from the large boulders in the meadow just below the large aspen stand. From here, walk north about 100 yards to 1st baseline stake, a short fencepost tagged #7845. The study runs basically southwest from here.





Map Name: Red Creek Reservoir Diagrammatic Sketch

Township 34S , Range 7W , Section 33 UTM 4186455.134 N, 355973.166 E

DISCUSSION

Trend Study No. 28-9 (47-9)

The Little Valley study was established to monitor use and trends in the aspen type. Elevation is 9,000 feet. Aspect is southeast with a slope of 5%. Scattered aspen clumps are found on the hillsides and in drainages above the large open meadows in the valleys. The stands are in differing stages of succession; from dense aspen regeneration in young stands, to decadent clumps with a grass understory and conifer invasion. The particular stand selected for the study is representative of the typical mixed browse-aspen stands in the area. At the time of study establishment, when cows were still on the allotment, cattle grazing had not impacted this stand as severely as the lower, more open stands closer to water. There were some signs of recent deer and elk use in 1992 and 1998.

This aspen grove is on a small bench surrounded by moderately steep and rocky slopes. Soil textural analysis indicates a sandy loam with a strongly acidic pH (5.3). The soil is deep with an average effective rooting depth (see methods) of almost 20 inches. Soil temperature was 42.4°F measured at nearly 18 inches. Percent organic matter content was high at an estimated 5.7%. Due to the high elevation and good precipitation, there is an abundance of vegetative cover. There is no evidence of erosion in the aspen, although surrounding areas showed signs of surface erosion and active gullies during the 1987 reading.

The key browse species in this type are aspen and snowberry. Aspen forms the dominant overstory with an estimated density of 5,798 plants/acre in 1987. During the 1987 reading, the density plots sampled two localized areas with particularly dense aspen regeneration. Consequently, the data showed 87% of the plants classified as young and a high percentage of seedlings. The young plants varied greatly in size, forage availability, and vigor. The average plants were 7-8 feet tall with available twigs being utilized. Most of the plants classified as decadent were suppressed seedlings or young trees. With the new larger sample size used in 1992, estimated density of aspen was lower at 3,200 plants/acre. Overall utilization was lighter and vigor and percent decadency improved. In 1998, aspen estimated density was 3,580 plants/acre. Utilization continues to be light and the sampled plants exhibit good vigor. The dead to live ratio is 1:4, with many of the tall aspen dead. The line intercept method indicates 39% aspen canopy cover, 10% white fir cover, and 3% Douglas fir cover in 1998.

Snowberry forms dense patches and had an overall density of 6,467 plants/acre in 1987. With the increased sample size used in 1992, the estimated density increased to 12,100 plants/acre with utilization considered light to moderate. In 1998, snowberry density decreased to an estimated 8,380 plants/acre. As in the past, these plants show light utilization and excellent vigor. Wood's rose density increased in 1992 with the increased sample size to an estimated density of 3,980 plants/acre. Over 75% of the plants encountered in 1992 were classified as seedling or young plants, indicating an increasing population. In 1998, density decreased to 1,380 plants/acre, nearly all of which were classified as mature. Other notable species are the preferred serviceberry and curlleaf mountain mahogany. Both of these species are relative uncommon in the aspen, but mature plants are dominant on the nearby rocky slopes above the site, along with big sagebrush, bitterbrush, and currant.

Grasses, along with the other herbaceous vegetation, form a lush and diverse understory and excellent ground cover. Ten grass species and one sedge were identified under the dense aspen canopy. The most common species are mountain brome, muttongrass, Carex, Kentucky bluegrass, and needlegrass, all of which are valuable, palatable forage plants. Fringed brome currently provides the most grass cover. A good diversity of forbs also occur on the site with 26 species encountered on the frequency belts in 1992 and 28 species encountered in 1998. Common plants that provide forage throughout the area are dandelion, yarrow, and salsify. Perennial herbaceous understory sum of nested frequency shows a steadily decline from 1987 to 1998.

1987 APPARENT TREND ASSESSMENT

The combination of a dense herbaceous understory and a fairly complete overstory of shrubs and aspen trees allows the buildup of an almost complete ground covering of litter. The percentage of vegetative cover is also high, leaving only 1% bare soil. Key browse species consisting of aspen and snowberry appear to have increasing populations. Herbaceous plants are abundant and diverse providing good forage for livestock and wildlife.

1992 TREND ASSESSMENT

Ground cover estimates show increased bare ground and rock cover and significantly less litter cover. Much of these differences are due to the increased sample size which distributed the frequency belts over a much larger area. All soil evaluations still point to a stable trend with no erosion occurring. Browse is diverse and abundant. Key species have increased with the exception of aspen. The decline in aspen is most likely due to the larger sample size and not a real decline in population density. Overall, trend for browse is up. The herbaceous understory is also diverse and abundant. Sum of nested frequency for grasses have increased slightly while those of forbs have declined. This would be expected, for forbs are usually the group of plants that are the first effected most by prolonged drought. Combined sum nested frequencies of grasses and forbs have declined slightly but the trend is stable.

TREND ASSESSMENT
soil - stable
browse - up
herbaceous understory - stable

1998 TREND ASSESSMENT

The soil trend is stable with abundant ground cover to protect against any erosion. The browse trend is stable with little change in the key species. The browse species appear to be excluding herbaceous understory species at this time. The herbaceous understory trend is downward. It was noted that this is a poor aspen site for a big game range trend study. The site should be moved to the edge of the aspen where more grasses and forbs are found. It appears that the overstory of browse and trees are suppressing the herbaceous understory species. Although the herbaceous understory is still diverse and provides abundant cover, there is an overall downward trend with a decrease in perennial herbaceous sum of nested frequency values.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - downward

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 9

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Agropyron trachycaulum	a10	b75	a27	5	33	14	1.12	.53
G	Bromus carinatus	124	95	99	47	39	38	1.99	2.40
G	Bromus ciliatus	b92	a25	a14	36	11	5	.52	7.81
G	Carex spp.	a33	b87	a42	14	37	18	1.52	2.05
G	Oryzopsis hymenoides	a-	b2	ab2	-	1	1	.15	.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Poa fendleriana	$_{a}$23	$_{b}$50	50	10	22	21	1.42	1.80
G	Poa pratensis	$_{b}$63	$_{a}$19	$_{ab}$32	24	12	13	.62	.26
G	Sitanion hystrix	19	31	14	7	14	7	.59	.11
G	Stipa columbiana	$_{b}$37	$_{b}$47	$_{a}$10	18	20	4	1.09	.09
G	Stipa comata	$_{c}$49	$_{b}$27	$_{a}$8	20	11	4	1.48	.19
G	Stipa lettermani	$_{a}$-	$_{b}$11	$_{b}$21	-	5	7	.10	.40
G	Unknown grass - perennial	5	3	-	2	1	-	.00	-
Total Annual Grasses		0	124	194	0	45	72	2.26	2.14
Total Perennial Grasses		455	348	125	183	161	60	8.39	13.60
F	Achillea millefolium	$_{b}$63	$_{ab}$48	$_{a}$36	25	19	13	1.64	1.30
F	Agoseris glauca	13	19	23	7	9	9	.31	.16
F	Antennaria rosea	-	-	3	-	-	2	-	.18
F	Androsace septentrionalis (a)	-	-	3	-	-	1	-	.00
F	Antennaria spp.	3	-	-	2	-	-	-	-
F	Artemesia biennis	-	-	2	-	-	1	-	.03
F	Artemisia dracunculus	$_{a}$-	$_{ab}$4	$_{b}$9	-	2	4	.01	.02
F	Artemisia ludoviciana	21	38	34	9	14	15	.19	.79
F	Aster chilensis	$_{b}$34	$_{b}$55	$_{a}$3	14	18	1	1.31	.18
F	Astragalus miser	$_{b}$78	$_{a}$41	$_{a}$22	36	19	11	1.00	.90
F	Castilleja linariaefolia	-	3	2	-	2	1	.03	.03
F	Cirsium wheeleri	$_{a}$-	$_{b}$20	$_{c}$42	-	9	21	.84	1.31
F	Collomia linearis (a)	-	$_{a}$1	$_{b}$43	-	1	19	.00	.64
F	Collinsia parviflora (a)	-	-	2	-	-	1	-	.00
F	Crepis spp.	$_{a}$-	$_{b}$13	$_{a}$-	-	7	-	.53	-
F	Cymopterus spp.	$_{b}$17	$_{a}$-	$_{a}$-	9	-	-	-	-
F	Eriogonum cernuum (a)	-	-	1	-	-	1	-	.15
F	Eriogonum elatum	$_{a}$-	$_{b}$19	$_{a}$-	-	7	-	.28	-
F	Erigeron flagellaris	$_{b}$59	$_{a}$12	$_{a}$19	26	6	8	.57	.14
F	Erigeron spp.	-	-	11	-	-	5	-	.10
F	Fragaria virginiana	$_{b}$36	$_{a}$6	$_{b}$20	13	2	11	.18	1.99
F	Gentianella heterosepala	$_{a}$-	$_{b}$24	$_{ab}$3	-	9	1	.69	.03
F	Geranium spp.	13	5	2	6	3	1	.18	.03
F	Ligusticum porteri	$_{a}$-	$_{b}$9	$_{b}$16	-	5	8	.37	.95
F	Lupinus argenteus	-	-	5	-	-	2	-	.03
F	Lychnis drummondii	-	3	3	-	1	1	.00	.03
F	Penstemon spp.	2	-	1	2	-	1	-	.03
F	Potentilla gracilis	-	3	-	-	1	-	.03	-
F	Polygonum spp.	-	4	-	-	2	-	.01	-
F	Smilacina racemosa amplexicaulis	-	-	-	-	-	-	-	.00

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
F	Taraxacum officinale	$_{b}$171	$_{a}$93	$_{a}$61	63	37	29	1.95	2.18
F	Thalictrum fendleri	32	26	21	15	14	9	1.09	2.54
F	Tragopogon dubius	28	19	22	12	8	12	.28	.39
F	Trifolium longipes	40	32	21	17	13	9	.36	.24
F	Verbascum thapsus	-	3	-	-	2	-	.06	-
F	Viguiera multiflora	$_{a}$-	$_{b}$8	$_{b}$8	-	5	5	.34	.12
Total Annual Forbs		0	1	49	0	1	22	0	0.79
Total Perennial Forbs		610	507	389	256	214	180	12.31	13.76

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 9

Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Abies concolor	2	2	1.00	.63
B	Amelanchier utahensis	14	11	.34	.66
B	Artemisia tridentata wyomingensis	0	0	-	-
B	Cercocarpus ledifolius	4	5	.63	.04
B	Chrysothamnus nauseosus	0	5	-	.30
B	Chrysothamnus viscidiflorus	8	7	.45	.71
B	Juniperus communis	18	22	12.09	6.53
B	Mahonia repens	17	10	1.61	1.55
B	Pachistima myrsinites	6	3	.63	1.27
B	Pinus edulis	1	1	.78	.15
B	Populus tremuloides	62	68	38.28	5.55
B	Prunus virginiana	0	2	-	-
B	Pseudotsuga menziesii	3	0	4.63	-
B	Quercus gambelii	0	0	-	-
B	Ribes spp.	3	5	-	.21
B	Rosa woodsii	30	21	4.44	2.13
B	Symphoricarpos oreophilus	87	79	15.53	21.54
Total for Browse		255	241	80.44	41.31

CANOPY COVER --
Herd unit 28 , Study no: 9

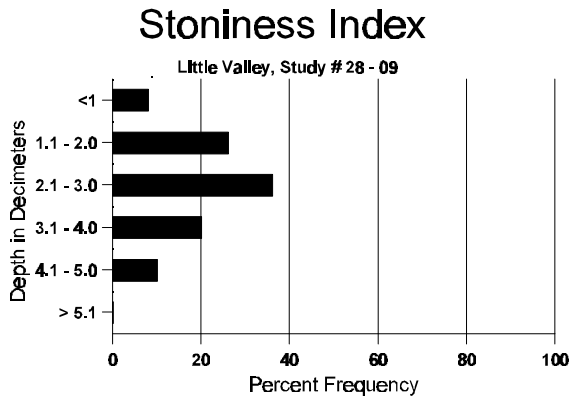
Species	Percent Cover '98
Abies concolor	10
Populus tremuloides	39
Pseudotsuga menziesii	3

BASIC COVER --
Herd unit 28 , Study no: 9

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	274	330	7.25	76.78	62.60
Rock	23	36	0	2.66	1.11
Pavement	20	20	0	0	1.00
Litter	232	399	91.50	82.80	90.13
Cryptogams	-	-	0	0	0
Bare Ground	32	42	1.25	3.47	4.39

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 09, Study Name: Little Valley

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.8	42.4 (17.7)	5.3	58.7	23.4	17.8	5.7	28.8	291.2	.5



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 9

Type	Quadrat Frequency '92	'98
Rabbit	6	-
Elk	5	-
Deer	6	-
Cattle	1	-

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 9

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Abies concolor																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	+ 0%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	40		-
	'98	40		-

Amelanchier utahensis																		
S	87	5	1	-	-	-	-	-	-	-	6	-	-	-	400			6
	92	2	-	-	3	-	-	-	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	14	2	1	-	-	-	-	-	-	16	1	-	-	1133			17
	92	12	15	-	15	3	-	-	-	-	38	3	4	-	900			45
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66	63	28	1
	92	1	5	-	-	-	-	1	-	-	7	-	-	-	140	-	-	7
	98	17	1	-	1	-	-	-	-	-	19	-	-	-	380	35	19	19

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	17%	06%	00%	-13%
'92	44%	00%	08%	-58%
'98	05%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	1199	Dec:	-
	'92	1040		-
	'98	440		-

Artemisia tridentata wyomingensis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	15	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	0		-
	'98	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cercocarpus ledifolius																		
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	2	2	1	-	-	-	-	-	5	-	-	-	100			5
	98	1	-	-	-	-	-	-	1	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	6	1	-	-	-	-	-	-	-	7	-	-	-	140	55	27	7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	100%	00%	00%	+34%
'92	40%	40%	00%	+44%
'98	11%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'92	100		-
	'98	180		-

Chrysothamnus nauseosus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	2	-	-	4	-	-	-	-	-	6	-	-	-	120	19	18	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	0		-
	'98	120		-

Chrysothamnus viscidiflorus																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	7	-	-	-	-	-	-	-	-	7	-	-	-	466	17	5	7
	92	6	-	-	4	-	-	-	-	-	10	-	-	-	200	-	-	10
	98	7	-	-	1	-	-	-	-	-	8	-	-	-	160	13	18	8
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-72%
'92	00%	00%	00%	-33%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	865	Dec:	8%
	'92	240		0%
	'98	160		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus communis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	3	-	-	3	-	-	1	-	-	7	-	-	-	140			7
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	1	-	-	-	-	-	4	-	-	-	80			4
M	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200	27	105	3
	92	7	-	-	20	-	-	7	-	-	34	-	-	-	680	-	-	34
	98	23	-	-	4	-	-	-	1	-	28	-	-	-	560	23	53	28

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+71%
'92	00%	00%	00%	- 6%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	200	Dec:	-
	'92	680		-
	'98	640		-

Mahonia repens																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	51	-	-	80	-	-	24	-	-	134	-	21	-	3100			155
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	195	-	-	-	-	-	-	-	-	195	-	-	-	13000	6	16	195
	92	67	-	-	26	-	-	-	-	-	93	-	-	-	1860	-	-	93
	98	66	-	-	13	-	-	-	-	-	79	-	-	-	1580	4	22	79

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-62%
'92	00%	00%	08%	-68%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	13133	Dec:	-
	'92	4960		-
	'98	1580		-

Pachistima myrsinites																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	20	-	-	4	-	-	25	-	-	-	500			25
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	27	43	-	-	-	-	57	-	-	127	-	-	-	2540	-	-	127
	98	150	-	-	-	-	-	-	-	-	150	-	-	-	3000	6	10	150

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	28%	00%	00%	- 1%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	3040		-
	'98	3000		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pinus edulis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	1	-	-	-	-	-	-	-	-	1	-	-	20	-	-	1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	100%	00%	00%	+ 0%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	20		-
	'98	20		-

Populus tremuloides																		
S	87	33	9	-	-	-	-	-	-	-	39	-	3	-	2800			42
	92	38	7	-	41	-	-	-	-	-	84	2	-	-	1720			86
	98	17	-	-	1	-	-	-	-	-	18	-	-	-	360			18
Y	87	6	17	15	1	-	-	-	37	-	73	-	2	1	5066			76
	92	61	16	2	11	-	-	3	42	-	119	8	8	-	2700			135
	98	102	-	-	15	-	-	1	-	-	118	-	-	-	2360			118
M	87	-	-	-	-	-	-	-	1	-	1	-	-	-	66	393	157	1
	92	1	-	-	-	-	-	1	15	-	17	-	-	-	340	-	-	17
	98	6	-	-	-	-	-	-	54	-	60	-	-	-	1200	-	-	60
D	87	5	4	1	-	-	-	-	-	-	7	-	2	1	666			10
	92	4	1	-	2	-	-	1	-	-	6	-	2	-	160			8
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1020			51

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	24%	18%	07%	-45%
'92	11%	01%	06%	+11%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	5798	Dec:	11%
	'92	3200		5%
	'98	3580		1%

Prunus virginiana																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	2	-	-	-	-	-	3	-	-	-	60	25	11	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	0		-
	'98	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pseudotsuga menziesii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	2	-	-	2	-	-	-	40	-	-	2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	60		-
	'98	0		-

Quercus gambelii																		
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	61	17	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	100%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'92	0		-
	'98	0		-

Ribes spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	57	26	1
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	4	-	-	1	-	-	-	-	-	5	-	-	-	100	53	29	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+18%
'92	00%	00%	00%	+20%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'92	80		-
	'98	100		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	92	93	21	-	28	-	-	11	-	-	153	-	-	-	3060			153
	98	7	-	-	4	-	-	-	-	-	11	-	-	-	220			11
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	18	19	-	7	-	-	2	-	-	46	-	-	-	920	-	-	46
	98	44	-	-	14	-	-	-	-	-	55	3	-	-	1160	19	15	58

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	100%	00%	00%	+97%
'92	20%	00%	00%	-65%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	133	Dec:	-	
'92	3980		-	
'98	1380		-	

Symphoricarpos oreophilus																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	92	9	-	-	10	-	-	6	-	-	25	-	-	-	500			25
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	23	4	-	-	-	-	-	-	-	26	1	-	-	1800			27
	92	78	14	-	111	-	-	11	-	-	214	-	-	-	4280			214
	98	22	5	-	12	-	-	-	-	-	39	-	-	-	780			39
M	87	53	14	-	-	-	-	-	-	-	67	-	-	-	4466	24	26	67
	92	247	15	-	124	-	-	5	-	-	391	-	-	-	7820	-	-	391
	98	282	1	-	97	-	-	-	-	-	380	-	-	-	7600	21	31	380
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	19%	00%	00%	+48%
'92	05%	00%	00%	-31%
'98	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	6266	Dec:	-
'92	12100		-
'98	8380		-

Trend Study 28-10-98

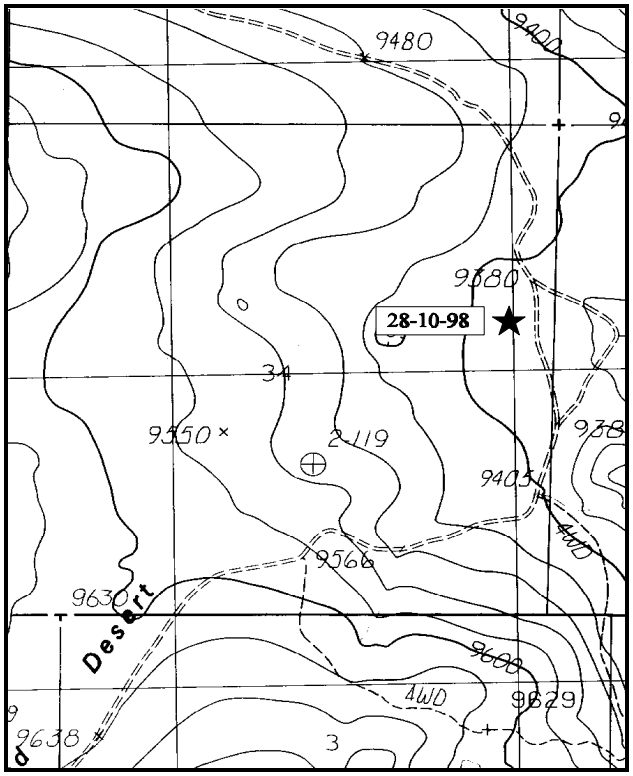
Study site name: Red Desert . Range type: Quaking Aspen .

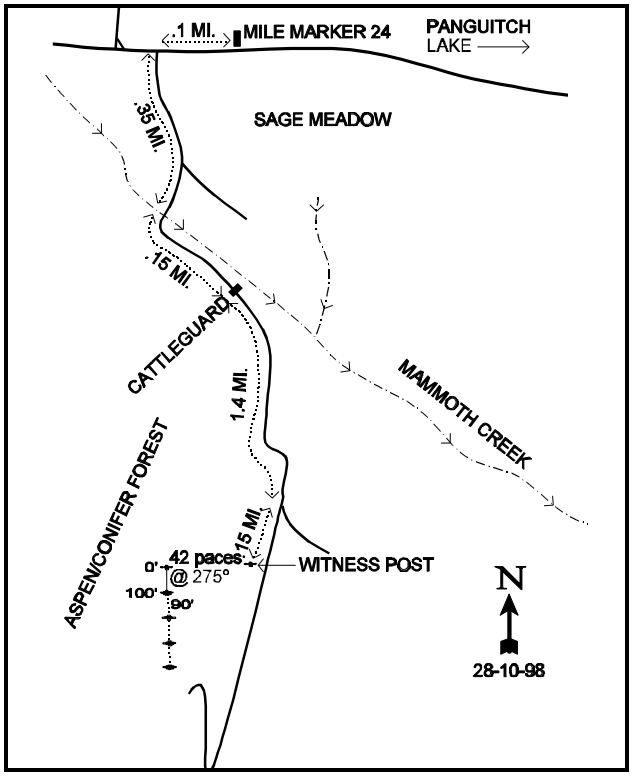
Compass bearing: frequency baseline 182 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From Panguitch Lake, travel southwest on the highway to mile marker 24 and continue 0.1 mile. Turn left (south) onto a dirt road. Proceed 0.25 miles to a fork, bear right. Go 0.1 mile to Mammoth Creek. Cross and continue for 0.15 miles to a cattleguard. Continue 1.4 miles to a fork, bear right. Proceed south 0.15 miles to the study area. There is a witness post (a 2-foot tall fencepost) on the right side of the road. The transect starts off in the forest, 242 feet (42 paces) southwest (275°) of the witness post. The 0-foot baseline stake, another 2-foot fencepost, is marked by a browse tag #9007. The study runs south from here (180°).





Map Name: Panguitch Lake Diagrammatic Sketch

Township 36S , Range 8W , Section 34 UTM 4167159.509 N, 348000.173 E

DISCUSSION

Trend Study No. 28-10 (47-10)

The Red Desert trend study is in the Mammoth Creek drainage on top of the Markagunt Plateau. Elevation is 9,400 feet and the area provides summer range for deer and elk. The site is almost level with a slightly east aspect. The range type consists of aspen with increasing numbers of subalpine fir and spruce as succession progresses toward a climax coniferous forest. Wildlife use is light to moderate and is likely exclusively summer use. In 1998, a pellet group transect parallel to the baseline indicated 25 deer days use/acre, 9 elk days use/acre, 7 sheep days use/acre, and 2 cow days use/acre. Thinning of some of the competing trees appears to have taken place within the past 10 years. In 1992, it appeared that some logging may take place as many of the trees were marked with blue spray paint. In 1998, it was apparent that logging did not occur in the study area.

The dark brown loam soil is moderately deep with an average effective rooting depth (see methods) of almost 16 inches. Soil textural analysis indicates a clay loam with a slightly acidic pH (6.1). There are some exposed rocky, bare areas but overall vegetative cover is good, especially in the openings where grasses and small forbs predominate. Erosion is minimal over all years.

The overstory of this open forest is mainly mature aspen trees. Most of the mature aspen are unavailable, as the trees average 80 feet in height. An uneven mix of age classes are present, from large decadent trees to clumps of young and scattered sprouts and seedlings. The density plot data from 1987 show that 15% of the population were mature trees (233 per acre). The 72% classified as decadent were all young sprouts about three feet tall, but the tops were dead due to a combination of competition, hedging, and insect damage. However, the plants were still alive as evidenced by sprouting from the base; and this is the growth that was measured. A few vigorous, unutilized young plants were found. Seedlings or small sprouts were common on two of the density plots. During the 1992 reading, aspen density was estimated at 1,320 plants/acre with a much larger sampling design. Percent decadency declined to 18% and biotic and reproductive potentials increased. Utilization was slightly heavier with 21% of the aspen displaying heavy hedging compared to 15% in 1987. In 1998, the estimated density was 1,020 plants/acre, most of which were classified as young plants. Many seedlings were also encountered (1,160 plants/acre). Percent decadency has declined and utilization is now mostly light. Line intercept data from 1998 indicated 11% canopy cover for aspen.

In 1987, it appeared that aspen were losing out to the subalpine fir. There were an estimated 1,599 subalpine fir trees per acre, 83% of which were classified as young. Seedling trees numbered 366 trees/acre. In 1992 and 1998, there were an estimated 1,040 subalpine fir. Age structure shows that the subalpine fir community is still comprised of mostly young trees. Engelmann spruce density is estimated to be 520 plants/acre in 1998, a great deal short of the 2,860 plants/acre estimated in 1992. As with the subalpine fir community, most of the Engelmann spruce trees were classified as young. It appears that these populations will increase due to the abundant numbers of seedling and young trees. Line intercept data from 1998 indicates 11% cover for Engelmann spruce and 13% cover for subalpine fir.

The open aspect of the understory provides a good site for herbaceous vegetation. Six species of rather short, tufted grasses and one sedge were encountered in 1987, nine during the 1992 reading, and eight in 1998. The sedge continues to be the most common species but has significantly declined since 1987. Other common species include mountain muhly and muttongrass. Forbs are also common but most are low-growing and unutilized. Weedy milkvetch, lobeleaf groundsel, pussytoes, and spring parsley are the most abundant species. Perennial herbaceous understory sum of nested frequency has declined from 1,226 in 1992 to 995 in 1998.

1987 APPARENT TREND ASSESSMENT

Ground cover is generally excellent due to the quantity of herbaceous vegetation which provides good ground cover in the openings. There is a buildup of litter, which constitutes 83% of the ground cover. Bare soil has a value of 8%. Aspen appears to be losing out to subalpine fir and spruce. The herbaceous understory is diverse and abundant, but grasses and forbs are low growing and provide limited forage.

1992 TREND ASSESSMENT

Soil erosion is not a problem on this site due to the lack of slope and the abundant vegetation and litter cover. With the new larger sample size, more bare ground and less litter were estimated, but the soil trend is still stable. Aspen, the key browse species, has increased slightly in density and has good biotic and reproductive potentials. Percent decadence has decreased significantly while utilization is slightly higher. The trend is stable to slightly up for the moment, but the trend will decline with the fir and spruce trees becoming larger. Continued logging would improve the forage production of this site. Sum of nested frequencies for grasses have declined slightly while forb frequencies have increased. Forbs make up 66% of the herbaceous understory cover. Trend for herbaceous understory is up slightly.

TREND ASSESSMENT
soil - stable
browse - stable to slightly up
herbaceous understory - slightly up

1998 TREND ASSESSMENT

The soil trend is stable with no current erosion apparent on the site. Percent vegetation and litter cover are high enough to keep accelerated erosion from occurring. The browse trend is stable. The densities for aspen, subalpine fir and Engelmann spruce appear to be stable at this time. There are many young and seedling plants in the populations which would indicate increases in density in the future. As the fir and spruce continue to increase in density, the aspen will decrease. The herbaceous understory trend is slightly downward with a decrease in perennial herbaceous understory sum of nested frequency.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - slightly downward

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Bromus ciliatus	44	38	25	17	16	11	.35	1.76
G	Carex spp.	$_{b}$151	$_{b}$142	$_{a}$104	66	65	48	1.91	1.87
G	Festuca ovina	$_{b}$81	$_{a}$44	$_{a}$28	31	22	12	.26	.18
G	Muhlenbergia montana	99	75	79	41	31	33	1.49	1.67
G	Poa fendleriana	$_{b}$57	$_{ab}$50	$_{a}$31	31	26	16	.51	.81
G	Poa pratensis	$_{a}$-	$_{b}$30	$_{b}$28	-	11	10	.78	.46
G	Sitanion hystrix	56	53	44	27	22	19	.84	.62

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'98	'87	'92	'98	'92	'98
G	Stipa comata	-	1	4	-	1	2	.00	.16
G	Stipa lettermani	$_{ab}$2	$_{b}$7	$_{a}$-	1	3	-	.16	.00
Total Annual Grasses		0	0	0	0	0	0	0	0
Total Perennial Grasses		490	440	343	214	197	151	6.32	7.56
F	Achillea millefolium	$_{a}$12	$_{b}$36	$_{b}$36	5	14	14	.58	.81
F	Agoseris glauca	-	14	11	-	5	6	.19	.08
F	Antennaria rosea	109	113	105	40	39	41	2.55	4.18
F	Androsace septentrionalis (a)	-	20	24	-	9	10	.04	.10
F	Arabis spp.	-	3	-	-	2	-	.01	-
F	Astragalus miser	$_{a}$39	$_{b}$142	$_{a}$85	20	58	41	4.95	1.93
F	Aster spp.	-	1	1	-	1	1	.03	.03
F	Cirsium foliosum	35	28	23	16	13	10	.28	.74
F	Cruciferae	$_{b}$17	$_{b}$23	$_{a}$3	9	10	1	.12	.00
F	Erigeron spp.	$_{b}$13	$_{a}$-	$_{a}$-	6	-	-	-	-
F	Frasera speciosa	-	1	-	-	1	-	.00	-
F	Fragaria virginiana	31	33	24	12	14	10	.78	1.61
F	Gentianella heterosepala	$_{a}$45	$_{a}$31	$_{b}$70	19	15	34	.39	.57
F	Lomatium spp.	54	78	65	21	33	29	1.04	1.06
F	Lychnis drummondii	$_{a}$-	$_{b}$25	$_{b}$18	-	12	8	.06	.06
F	Penstemon leiophyllus	22	22	7	11	10	4	.10	.02
F	Potentilla gracilis	24	6	12	10	4	6	.04	.08
F	Senecio multilobatus	$_{c}$156	$_{b}$121	$_{a}$86	60	51	38	.60	1.06
F	Senecio spp.	$_{a}$-	$_{b}$7	$_{a}$-	-	4	-	.09	-
F	Smilacina racemosa amplexicaulis	2	-	-	1	-	-	-	-
F	Taraxacum officinale	$_{b}$60	$_{ab}$41	$_{a}$35	34	23	19	.49	.27
F	Tragopogon dubius	$_{b}$20	$_{a}$5	$_{a}$-	9	3	-	.04	-
F	Trifolium longipes	$_{a}$60	$_{ab}$56	$_{b}$71	19	22	25	.82	2.16
Total Annual Forbs		0	20	24	0	9	10	0.04	0.10
Total Perennial Forbs		699	806	676	292	343	297	13.27	14.81

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 10

Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Abies lasiocarpa	17	20	11.45	7.39
B	Juniperus communis	3	0	.95	-
B	Picea engelmannii	20	13	8.56	7.48
B	Populus tremuloides	30	26	10.86	2.15
Total for Browse		70	59	31.83	17.03

CANOPY COVER --
Herd unit 28 , Study no: 10

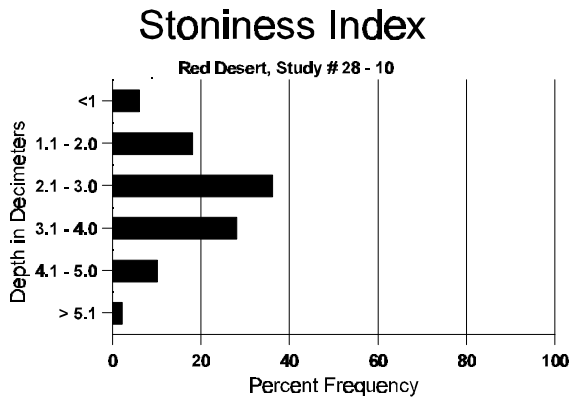
Species	Percent Cover '98
Abies lasiocarpa	13
Populus tremuloides	11
Pseudotsuga menziesii	11

BASIC COVER --
Herd unit 28 , Study no: 10

Cover Type	Nested Frequency '92	'98	Average Cover % '87	'92	'98
Vegetation	295	292	6.25	47.14	45.03
Rock	24	42	2.00	1.68	1.36
Pavement	-	38	0	0	.69
Litter	248	395	83.25	74.00	80.59
Cryptogams	33	46	1.00	2.88	.57
Bare Ground	51	96	7.50	5.78	5.45

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 10, Study Name: Red Desert

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	39.4 (16.7)	6.1	38.7	29.4	21.8	3.2	27.6	118.4	.3



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 10

Type	Quadrat Frequency '92	'98
Sheep	2	-
Elk	-	2
Deer	5	5

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 10

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Abies lasiocarpa																		
S	87	11	-	-	-	-	-	-	-	-	11	-	-	-	366			11
	92	21	3	-	3	-	-	4	-	-	31	-	-	-	620			31
	98	8	-	-	2	-	-	-	-	-	10	-	-	-	200			10
Y	87	40	-	-	-	-	-	-	-	-	40	-	-	-	1333			40
	92	24	2	-	5	6	-	1	-	-	37	-	-	-	760			38
	98	10	-	-	23	-	-	-	-	-	33	-	-	-	660			33
M	87	7	-	1	-	-	-	-	-	-	8	-	-	-	266			8
	92	2	-	-	-	-	-	2	8	-	12	-	-	-	240			12
	98	8	-	-	-	-	-	-	11	-	19	-	-	-	380			19
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	1	-	-	2	-	-	-	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	02%	00%	-35%
'92	15%	00%	00%	+ 0%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	1599	Dec:	0%
	'92	1040		4%
	'98	1040		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus communis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'92	80		-
	'98	0		-

Picea engelmannii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	21	3	-	1	-	-	-	-	-	25	-	-	-	2720			136
	98	16	-	-	-	-	-	-	1	-	17	-	-	-	340			17
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	1	-	-	2	3	-	7	-	-	-	140	-	-	7
	98	4	-	-	-	-	-	-	5	-	5	-	-	-	180	-	-	9
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	02%	00%	00%	-82%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'92	2860		-
	'98	520		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Populus tremuloides																		
S	87	7	3	3	-	-	-	-	-	-	11	-	2	-	433			13
	92	56	15	5	-	-	-	-	-	-	76	-	-	-	1520			76
	98	58	-	-	-	-	-	-	-	-	58	-	-	-	1160			58
Y	87	1	-	-	1	-	-	-	-	-	2	-	-	-	66			2
	92	1	30	9	-	-	-	2	2	-	44	-	-	-	880			44
	98	32	4	1	-	-	-	-	-	-	37	-	-	-	760			38
M	87	-	-	-	-	-	-	-	4	3	7	-	-	-	233	393	74	7
	92	-	-	3	-	-	-	-	7	-	10	-	-	-	200	-	-	10
	98	1	-	-	-	-	-	-	12	-	13	-	-	-	260	-	-	13
D	87	7	15	2	-	-	-	-	-	-	22	-	2	-	800			24
	92	1	9	2	-	-	-	-	-	-	10	-	1	1	240			12
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	45%	15%	06%	+17%
'92	59%	21%	03%	-23%
'98	08%	02%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1099	Dec:		73%
'92	1320			18%
'98	1020			0%

Trend Study 28-11-98

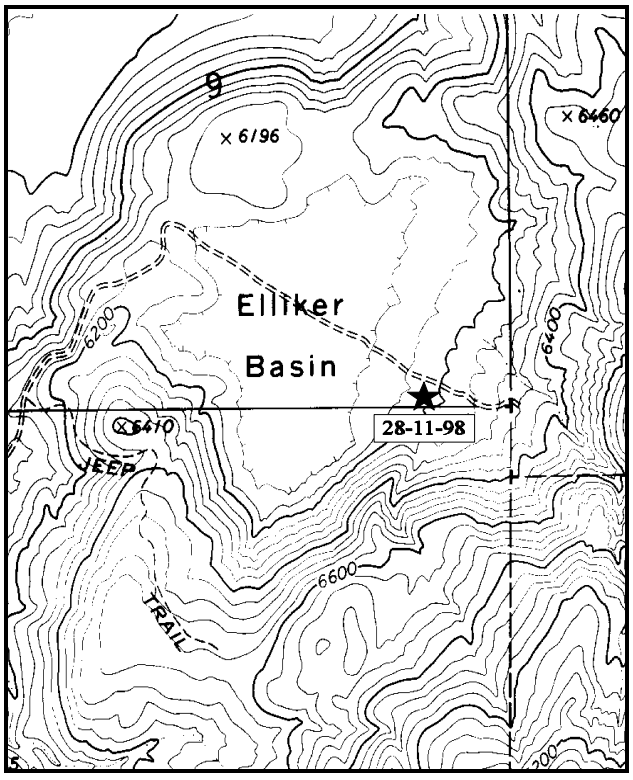
Study site name: Elliker Basin . Range type: Big Sagebrush .

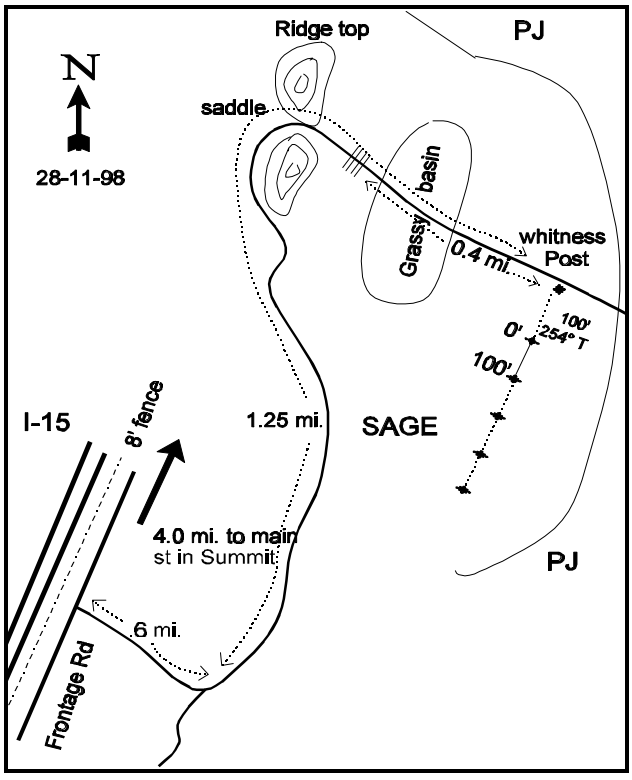
Compass bearing: frequency baseline 247 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From Summit, at the I-15 interchange (exit 71), go south on the frontage road (Summer Tree Dr.) on the east side of the freeway for 4.0 miles. Turn left on to a dirt road, proceed through a gate and go east for 0.6 miles. Bear left at the fork and continue 1.25 miles to Elliker Basin and up to a witness post in the sagebrush on the right. The transect starts 12 paces away bearing 221 degrees magnetic, at the 2-foot tall fencepost tagged #495 which marks the 0-foot end of the baseline.





Map Name: Summit Diagrammatic Sketch

Township 35S , Range 10W , Section 9 UTM 4181553.186 N, 325672.095 E

DISCUSSION

Trend Study No. 28-11 (47-11)

Elliker Basin is a small sagebrush valley at the base of the Hurricane Cliffs, about 8 miles northeast of Cedar City. The transect itself is located on the southeastern slope of the basin at an elevation of 6,160 feet, just below the line of pinyon-juniper which continue up the cliffs. Slope is 10-15% with a west aspect. The area is very important deer winter range, which was acquired by the DWR in a trade with the BLM. Pinyon and juniper dominate the slopes bordering the valley. The area was apparently seeded years ago. Additionally, a hand chainsaw treatment was done during the spring of 1992 to eliminate encroaching juniper trees. Many of these trees seen in 1992 were reported to be still alive and growing below the cut, however they were dead in 1998. Deer pellet groups are fairly abundant. A pellet group transect read in 1998 indicates 44 deer days use/acre and 1 elk day use/acre.

Soil textural analysis indicates a loam soil with a moderately acidic pH (5.8). The average effective rooting depth (see methods) was just over 14 inches with an average temperature of 52°F measured at a depth of 16 inches. The soil surface and the soil profile are rocky throughout. Soil movement is a problem on roads up to the basin, and there is some slight sign of current overland water flow in some areas across the flat.

The key browse species is mountain big sagebrush. In 1987, mountain big sagebrush had an estimated density of 2,466 plants/acre. Twenty-seven percent of the population was decadent and overall use was moderate to heavy with 30% of the sagebrush displaying heavy use. Utilization varied between individuals and location in the basin. Plants in the lowest area appeared heavily hedged and have comparatively poor growth and vigor, although this condition could also be related to soil type and/or water table conditions which caused problems during the exceptionally wet years of 1982-85 for many low lying areas throughout the state. In 1992, the estimated density was 3,400 plants/acre. Percent decadence increased to 50% while the proportion of heavily hedged plants declined to 16%. Twenty-eight percent of the mature and decadent sagebrush displayed poor vigor, up from 5% in 1987. Comparing the photographs and written observations from 1987 and 1992, it is most likely that the increase in decadency in 1992 is not due to heavy use. Drought, competition with winter annuals, root fungus, shoot fungus, winter injury, or a combination of these factors can cause the increased decadency. Some sagebrush crowns were only partially dead and these plants still contained abundant annual growth from the previous growing season. In 1998, the estimated density was 3,120 plants/acre. Percent decadency has declined to 25% of the population and the percentage of plants classified as exhibiting poor vigor has declined to 5%. Also in 1998, many seedling plants were encountered (3 ,480 plants/acre). It is likely that most of these plants will not survive the 1998 summer. The small percentage of the plants that do survive will help improve the condition of the population.

Pinyon and juniper dominate the surrounding slopes and have invaded into the upper part of the sagebrush valley. The juniper trees to the west and on the slope below the basin were severely highlined in 1987. The chainsaw treatment cut down all the juniper on the study site, but some trees were still alive at the time of the 1992 reading. In 1998, the pinyon and juniper trees that were cut down, but reported to be alive on the site in 1992, were dead. The only other browse species encountered on the site include small numbers of rubber rabbitbrush, low rabbitbrush, broom snakeweed, and prickly-pear cactus.

The herbaceous understory continues to be dominated by cheatgrass, although its sum of nested frequency has significantly decreased since 1992 from 369 to 330. Sixweeks fescue is also abundant. One seeded grass, intermediate wheatgrass, is still found on the site in small numbers. Crested wheatgrass, which occurred in 1987, has not been sampled since. Purple three-awn and bottlebrush squirreltail have shown a significant decrease in nested frequency over all years. Conversely, sand dropseed and galleta have shown a steady increase since 1987. Forbs are rare on the site. Five perennial and four annual species were encountered in 1998. Forbs offer little cover or forage and account for only 2% of the total vegetative cover.

1987 APPARENT TREND ASSESSMENT

Litter greatly contributes to the ground cover beneath sagebrush plants, but in the shrub interspaces the vegetative and litter cover are limited. The very high concentration of pavement and rocks on the surface in the exposed areas made up 58% of the ground cover. Therefore, the soil itself is fairly well protected and only 2% of the surface was identified as bare soil. The key browse consisting of mountain big sagebrush is mostly mature, 30% of which is heavily hedged. Vigor is generally good and percent decadency is average for a site like this (27%). Sagebrush recruitment is very low however, with only a few seedlings and no young encountered. The abundance of grasses is fair and dominated by warm season species. Cheatgrass is prevalent in the understory. Forbs are rare.

1992 TREND ASSESSMENT

Soil conditions are similar to the 1987 reading. Some of the differences in bare soil and rock cover are likely due to the new and larger sample size. Litter increased due to downed juniper trees from the chain saw treatment. Some soil movement is still detectable, but the nearly continuous cover of rock, pavement and cheatgrass adequately protects what is left of the soil. Trend for soil is stable. Sagebrush, the key browse species, has an increased estimated density, but decadency has increased from 27% to 51% due to factors other than heavy utilization. Along with increased decadency, vigor is also reduced with 28% of the mature and decadent shrubs displaying poor vigor. These factors, combined with a poor biotic and reproductive potential indicate a continuing downward browse trend. The herbaceous understory is dominated by cheatgrass, sixweeks fescue, and a few annual forbs which make up 55% of the herbaceous understory cover. Perennial grasses consist primarily of three warm season grasses. Perennial forbs are rare. Sum of nested frequencies for perennial grasses and forbs combined, have remained stable since 1987.

TREND ASSESSMENT
soil - stable
browse - down
herbaceous understory - stable, but dominated by cheatgrass

1998 TREND ASSESSMENT

The soil trend is stable. Percent vegetation cover has declined while percent litter cover increased. The browse trend is slightly down. Both percent decadency and the percentage of plants classified as dying have decreased since 1992, but are still relatively high. Biotic potential is extremely high this season, but it is unlikely that many of the seedling plants will survive through the summer. Utilization has shifted from moderate to heavy use in 1987 to light to moderate use in 1998. The herbaceous understory is stable. Cheatgrass still dominates the herbaceous understory, but has significantly declined in nested frequency since 1992.

TREND ASSESSMENT
soil - stable
browse - slightly down, continuing downward, but at a much slower rate of decline
herbaceous understory - stable, but still dominated by cheatgrass

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 11

Type	Species	Nested Frequency '87	'92	'98	Quadrat Frequency '87	'92	'98	Average Cover % '92	'98
G	Agropyron cristatum	7	-	-	3	-	-	-	-
G	Agropyron intermedium	25	17	38	11	8	13	.89	2.65
G	Agropyron smithii	3	-	-	2	-	-	-	-
G	Aristida purpurea	$_{c}$77	$_{b}$34	$_{a}$9	31	15	5	.42	.19
G	Bromus tectorum (a)	-	$_{b}$369	$_{a}$330	-	100	95	32.16	7.40
G	Hilaria jamesii	$_{a}$-	$_{b}$21	$_{c}$30	-	9	11	1.70	1.88
G	Oryzopsis hymenoides	-	1	-	-	1	-	.03	-
G	Poa secunda	-	-	6	-	-	2	-	.18
G	Sitanion hystrix	$_{b}$18	$_{ab}$12	$_{a}$8	11	6	3	.49	.09
G	Sporobolus cryptandrus	$_{a}$6	$_{b}$32	$_{b}$43	2	15	15	1.23	2.52
G	Stipa comata	-	3	1	-	1	1	.15	.15
G	Vulpia octoflora (a)	-	145	146	-	51	58	.77	.58
Total Annual Grasses		0	514	476	0	151	153	32.93	7.98
Total Perennial Grasses		136	120	135	60	55	50	4.92	7.70
F	Agoseris glauca	-	-	15	-	-	8	-	.14
F	Artemisia ludoviciana	-	1	6	-	1	2	.01	.18
F	Astragalus spp.	-	2	-	-	1	-	.03	-
F	Calochortus nuttallii	-	-	6	-	-	3	-	.04
F	Chenopodium spp. (a)	-	1	-	-	1	-	.00	-
F	Draba spp. (a)	-	$_{a}$-	$_{b}$50	-	-	18	-	.09
F	Microsteris gracilis (a)	-	$_{b}$81	$_{a}$37	-	37	17	.23	.13
F	Orobanche fasciculata	-	1	3	-	1	1	.00	.00
F	Plantago patagonica (a)	-	8	4	-	3	2	.01	.01
F	Ranunculus testiculatus (a)	-	-	22	-	-	11	-	.10
F	Tragopogon dubius	-	-	4	-	-	2	-	.01
Total Annual Forbs		0	90	113	0	41	48	0.24	0.33
Total Perennial Forbs		0	4	34	0	3	16	0.05	0.38

Values with different subscript letters are significantly different at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 11

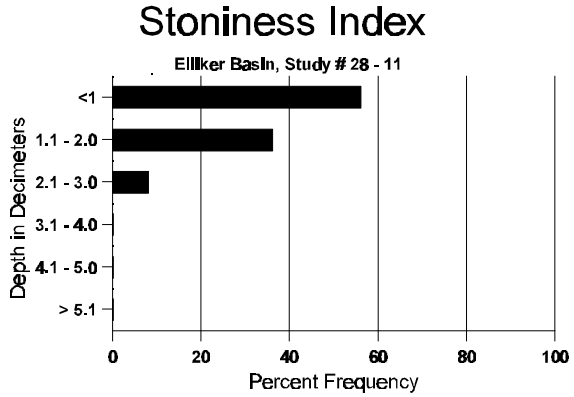
Type	Species	Strip Frequency '92	Strip Frequency '98	Average Cover % '92	Average Cover % '98
B	Artemisia tridentata vaseyana	73	76	23.90	23.32
B	Chrysothamnus nauseosus albicaulis	0	1	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	-	.15
B	Gutierrezia sarothrae	7	4	.15	.03
B	Opuntia spp.	2	2	.15	.15
B	Purshia tridentata	0	0	-	-
Total for Browse		82	84	24.20	23.65

BASIC COVER --
Herd unit 28 , Study no: 11

Cover Type	Nested Frequency '92	Nested Frequency '98	Average Cover % '87	Average Cover % '92	Average Cover % '98
Vegetation	375	363	3.75	47.87	38.06
Rock	130	209	19.75	48.12	11.02
Pavement	234	310	37.75	0	27.36
Litter	267	384	37.25	23.97	41.11
Cryptogams	8	20	0	.04	.12
Bare Ground	80	170	1.50	4.53	9.89

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 11, Study Name: Elliker Basin

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.2	52.0 (16.0)	5.8	50.7	31.4	17.8	2.8	10.6	99.2	.5



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 11

Type	Quadrat Frequency '92	'98
Rabbit	26	19
Elk	-	1
Deer	27	47

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 11

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	174	-	-	-	-	-	-	-	-	174	-	-	-	3480			174
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	4	4	-	1	1	-	-	-	-	10	-	-	-	200			10
	98	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	87	4	17	6	-	-	-	-	-	-	27	-	-	-	1800	27	33	27
	92	26	38	9	1	-	-	-	-	-	69	3	-	2	1480	-	-	74
	98	74	36	-	-	1	-	-	-	-	111	-	-	-	2220	23	39	111
D	87	1	4	5	-	-	-	-	-	-	8	-	1	1	666			10
	92	37	31	18	-	-	-	-	-	-	39	2	5	40	1720			86
	98	27	11	-	1	-	-	-	-	-	31	-	-	8	780			39
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	540			27

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	57%	30%	05%	+27%
'92	44%	16%	28%	- 8%
'98	31%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	2466	Dec:	27%	
'92	3400		51%	
'98	3120		25%	

Chrysothamnus nauseosus albicaulis																		
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	0%
'92	0		0%
'98	60		100%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60	6	5	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'92	0			-
'98	60			-

Gutierrezia sarothrae																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	10	4	2
	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160	-	-	8
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	8	9	5
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	-32%
'98	00%	00%	00%	-11%

Total Plants/Acre (excluding Dead & Seedlings)			
'87	265	Dec:	25%
'92	180		11%
'98	160		0%

Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20	5	12	1
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	+ 0%
'98	00%	00%	50%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	0%
'92	40		0%
'98	40		50%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	27	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'92	0		-
	'98	0		-

Trend Study 28-13-98

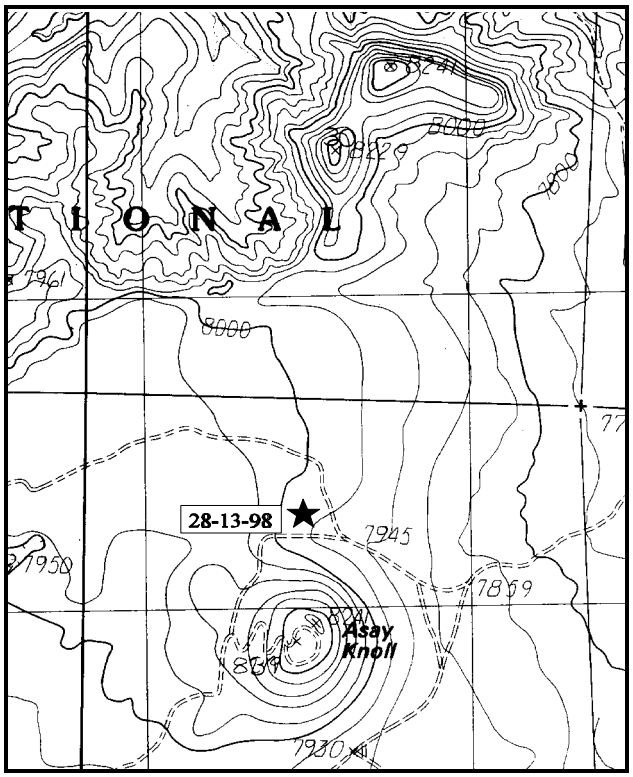
Study site name: Asay Knoll . Range type: Sagebrush-Grass Burn .

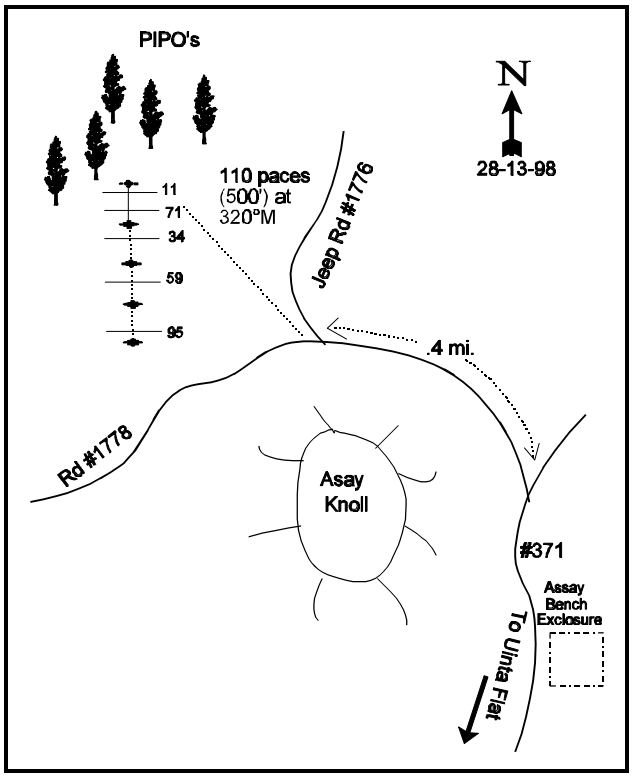
Compass bearing: frequency baseline 195 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

Turn off highway 143 onto Mammoth Creek Rd. Drive 3.5 miles, turn right across Mammoth Creek, staying on Road #68. Continue 0.5 miles to a "T" and turn right. Drive another 4.6 miles and turn left onto the Uintah Flat Road. Follow this road for 3.0 miles and turn left onto Road # 371 toward Asay Bench. Go 1.4 miles until you just pass the Asay Bench Exclosure where a faint dirt road circumventing the knoll is visible on the left. Follow this road 0.4 miles to the fork of Road # 1778 and #1776. Stop here then walk NW to the study site 110 paces at a bearing of 320° M. The site is marked with half high fenceposts.





Map Name: Asay Bench Diagrammatic Sketch

Township 37S , Range 6W , Section 31 UTM 4157389.478 N, 361502.099 E

DISCUSSION

Trend Study No. 28-13 (47-13)

The Asay Knoll trend study was established in 1992. It is located in an 8,000 acre burn in the Asay Bench, Little Mountain, and Uintah Flat area which burned in July of 1989. The elevation at the site is 7,920 feet with a gentle 8% slope and a southeast aspect. The area originally consisted of open sagebrush meadows and Ponderosa pine forests with a fairly dense understory of mountain big sagebrush, bitterbrush, snowberry, serviceberry, and currant. The study site occurs on an open park area with a few burned Ponderosa trees. In 1992, the burned trees were still standing, while in 1998, the burned trees were on the ground. Surrounding the site on the northeast side of Asay Knoll are patches of burned and unburned Ponderosa pine, aspen, and sagebrush-grass meadows. A stock pond is found 1/4 mile away. In 1992, some cattle sign was noted along with some older elk and deer sign. In 1998, a pellet group transect indicated 20 elk days use/acre, 6 deer days use/acre, and 1 cow day use/acre.

Soil textural analysis indicated a sandy loam soil with a neutral pH (7.1). The soil is shallow and rocky with an average effective rooting depth (see methods) of almost 12 inches and a soil temperature of 64.4°F measured at a depth of 12 inches. In the more open areas, the soil is slightly deeper but still rocky on the surface. Erosion is not a problem due to the abundant vegetation, rock, gently slope, and litter cover.

Shrubs are diverse with 13 species encountered in 1998. Shrubs made up 15% of the vegetation cover in 1992 and now make up 51% vegetative cover in 1998. Not all the sagebrush was eliminated by the fire and the surviving plants are vigorous and producing seed. Mountain big sagebrush is the most abundant with an estimated density of 2,340 plants/acre in 1992 and 4,760 plants/acre in 1998. Age structure indicates a healthy population with many seedling and young plants encountered in both years. Utilization is light and vigor is good. Oregon grape density has declined from 6,670 plants/acre in 1992 to 3,900 plants/acre in 1998. These are small stature plants averaging only 5 inches in height. Some bitterbrush are present with an estimated density of 260 plants/acre in 1998. Other shrubs include: several subspecies of rubber rabbitbrush, fendler ceanothus, chokecherry, currant, Wood's rose, and elderberry. Browse on the site is mostly lightly hedged.

The herbaceous understory is diverse and abundant. Perennial grasses currently account for 23% of the total vegetation cover. Muttongrass is the most abundant grass and provides 15% of the herbaceous understory cover. Other grasses include: bottlebrush squirreltail, slender wheatgrass, a sedge, and Letterman's needlegrass. Perennial grass sum of nested frequency has increased from 365 in 1992 to 411 in 1998. In 1992, most of the species were early seral, annual weeds or weedy increaser perennials. This is still the case although some of the early seral species were not encountered in 1998. Forb cover provided 58% of the vegetation cover in 1992. This has decreased to 26% in 1998.

1992 APPARENT TREND ASSESSMENT

Soil conditions are stable with adequate vegetation, litter, and rock cover to help prevent erosion. Browse is diverse with 15 species encountered. Total browse density is 11,760 plants/acre of which 4,040 plants/acre are desirable browse species. Mountain big sagebrush is the key species with an estimated density of 2,340 plants/acre, which are mostly young plants. Apparent trend for sagebrush is up. Other browse species also appear to be slowly increasing in density. The herbaceous understory is also diverse and abundant with nine species of grass and 23 species of forbs encountered during the 1992 reading. Forbs consist primarily of perennial weedy increasers and annual weeds. Nested frequencies of grasses and forbs will likely decline somewhat in the future as succession, natural thinning, and species competition occurs.

TREND ASSESSMENT
soil - stable
browse - improving
herbaceous understory - stable with poor forb composition

1998 TREND ASSESSMENT

The soil trend is stable with an increase in percent vegetation and litter cover. There is no apparent erosion on the site at this time. The browse trend is stable with many species encountered in 1998. The mountain big sagebrush population is healthy with increasing density. The herbaceous understory is slightly upward. Both grass and forb sum of nested frequency has increased since 1992. Several of the early seral annual species encountered in 1992 were not present in 1998.

TREND ASSESSMENT
soil - stable
browse - stable with healthy browse populations
herbaceous understory - slightly upward with an increase in perennial nested frequency

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 13

Type	Species	Nested Frequency '92	Nested Frequency '98	Quadrat Frequency '92	Quadrat Frequency '98	Average Cover % '92	Average Cover % '98
G	Agropyron smithii	34	*12	14	4	.75	.09
G	Agropyron trachycaulum	18	*46	6	20	.27	.93
G	Bouteloua gracilis	30	22	9	9	.85	.43
G	Bromus japonicus (a)	-	7	-	2	-	.01
G	Bromus tectorum (a)	-	5	-	1	-	.00
G	Carex spp.	54	38	22	21	2.22	1.31
G	Koeleria cristata	14	15	7	6	.18	.41
G	Poa fendleriana	75	95	26	33	2.07	3.38
G	Poa pratensis	16	25	5	10	.94	.65
G	Poa secunda	-	*24	-	11	-	.73
G	Sitanion hystrix	73	64	31	32	2.17	1.02
G	Stipa columbiana	-	*11	-	5	-	.24
G	Stipa comata	17	*27	6	13	.57	1.01
G	Stipa lettermani	34	32	11	11	2.23	.48
Total Annual Grasses		0	12	0	3	0	0.01
Total Perennial Grasses		365	411	137	175	12.28	10.74
F	Agoseris glauca	-	1	-	1	-	.00
F	Antennaria rosea	6	7	2	3	.30	.30
F	Arabis spp.	36	*6	13	2	.23	.04
F	Artemisia ludoviciana	120	*187	42	55	5.11	5.98
F	Aster spp.	10	*-	4	-	.33	-

Type	Species	Nested Frequency '92	'98	Quadrat Frequency '92	'98	Average Cover % '92	'98
F	Astragalus spp.	-	-	-	-	.00	-
F	Chenopodium album (a)	251	*-	74	-	2.67	-
F	Corydalis aurea	40	*-	17	-	1.66	-
F	Collinsia parviflora (a)	-	*139	-	52	-	.98
F	Crepis acuminata	-	3	-	2	-	.03
F	Descurainia pinnata (a)	34	15	14	8	1.25	.06
F	Epilobium paniculatum (a)	51	44	21	17	.22	1.27
F	Erigeron caespitosus	53	55	20	18	1.65	.46
F	Erigeron divergens	55	*192	22	63	1.22	2.51
F	Erigeron flagellaris	9	*14	4	6	.12	.18
F	Eriogonum racemosum	9	14	4	6	.22	.28
F	Lappula occidentalis (a)	75	*26	31	10	2.00	.05
F	Lepidium spp. (a)	219	*7	67	4	4.82	.07
F	Machaeranthera canescens	1	-	1	-	.00	-
F	Microsteris gracilis (a)	6	5	2	2	.01	.03
F	Phlox longifolia	3	3	2	1	.01	.00
F	Polygonum douglasii (a)	2	1	2	1	.01	.00
F	Potentilla pennsylvanica	1	3	1	1	.18	.01
F	Taraxacum officinale	1	-	1	-	.01	-
F	Tragopogon dubius	6	1	3	1	.01	.03
F	Trifolium spp.	4	5	2	2	.01	.01
F	Verbascum thapsus	-	1	-	1	-	.03
F	Viguiera multiflora	52	*-	24	-	3.88	-
Total Annual Forbs		638	237	211	94	10.98	2.46
Total Perennial Forbs		406	492	162	162	15.02	9.92

* Indicates significant difference at % = 0.10

BROWSE TRENDS --
Herd unit 28 , Study no: 13

Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Amelanchier utahensis	1	2	-	.00
B	Artemisia tridentata vaseyana	46	74	1.98	15.49
B	Ceanothus fendleri	7	7	.30	.07
B	Chrysothamnus nauseosus	9	26	.73	.70
B	Haplopappus scopulorum	28	37	.24	1.90
B	Mahonia repens	26	24	1.64	1.81
B	Opuntia spp.	4	7	.03	.36
B	Pinus ponderosa	0	0	.00	-

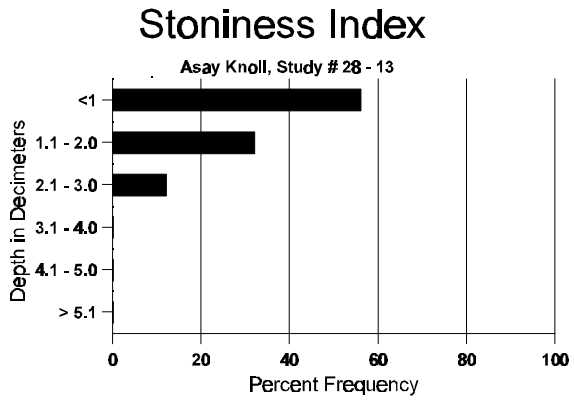
Type	Species	Strip Frequency '92	'98	Average Cover % '92	'98
B	Prunus virginiana	4	4	.63	1.06
B	Purshia tridentata	7	12	.14	1.03
B	Ribes cereum cereum	1	2	.03	.03
B	Rosa woodsii	3	5	-	.03
B	Sambucus cerulea	2	2	-	.66
B	Symphoricarpos oreophilus	13	13	.93	.47
Total for Browse		151	215	6.68	23.66

BASIC COVER --
Herd unit 28 , Study no: 13

Cover Type	Nested Frequency '92	'98	Average Cover % '92	'98
Vegetation	429	395	37.31	44.15
Rock	279	392	45.18	39.32
Pavement	20	188	0	2.92
Litter	325	442	23.51	30.92
Cryptogams	-	37	.01	.74
Bare Ground	270	321	20.10	18.57

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 13, Study Name: Asay Knoll

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.0	54.2 (13.7)	6.1	38.7	37.4	23.8	3.9	16.9	160.0	.4



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 13

Type	Quadrat Frequency '92	'98
Rabbit	1	4
Elk	16	11
Deer	15	16
Cattle	-	1

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 13

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20	39	50	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	+50%
'98	50%	50%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'92	20	Dec:	-
	'98	40		-

Artemisia tridentata vaseyana																		
S	92	10	-	-	4	-	-	-	-	-	14	-	-	-	280			14
	98	22	-	-	3	-	-	-	-	-	25	-	-	-	500			25
Y	92	77	2	-	-	-	-	-	-	-	79	-	-	-	1580			79
	98	81	-	-	-	-	-	1	-	-	82	-	-	-	1640			82
M	92	35	3	-	-	-	-	-	-	-	38	-	-	-	760	-	-	38
	98	126	29	-	1	-	-	-	-	-	155	1	-	-	3120	22	29	156
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	04%	00%	00%	+51%
'98	12%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'92	2340	Dec:	-
	'98	4760		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceanothus fendleri																		
Y	92	6	2	-	-	-	-	-	-	-	8	-	-	-	160			8
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
M	92	1	4	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
	98	2	5	-	-	-	-	-	-	-	7	-	-	-	140	12	31	7
D	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing			Moderate Use		Heavy Use			Poor Vigor								%Change		
	'92		46%		00%			00%								-23%		
	'98		70%		00%			10%										
Total Plants/Acre (excluding Dead & Seedlings)													'92		260	Dec:		0%
													'98		200			10%
Chrysothamnus nauseosus																		
S	92	56	-	-	-	-	-	-	-	-	56	-	-	-	1120			56
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	98	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	92	7	-	-	-	-	-	-	-	-	7	-	-	-	140	-	-	7
	98	18	-	1	2	-	-	-	-	-	21	-	-	-	420	17	25	21
D	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	7	-	-	1	-	-	-	-	-	6	-	-	2	160			8
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
% Plants Showing			Moderate Use		Heavy Use			Poor Vigor								%Change		
	'92		00%		00%			00%								+69%		
	'98		00%		03%			06%										
Total Plants/Acre (excluding Dead & Seedlings)													'92		220	Dec:		0%
													'98		720			22%
Haplopappus scopulorum																		
S	92	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	92	5	2	-	-	-	-	-	-	-	7	-	-	-	140			7
	98	8	-	-	1	-	-	-	-	-	9	-	-	-	180			9
M	92	27	2	-	-	-	-	-	-	-	29	-	-	-	580	-	-	29
	98	55	2	-	6	-	-	-	-	-	63	-	-	-	1260	9	10	63
D	92	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
	98	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing			Moderate Use		Heavy Use			Poor Vigor								%Change		
	'92		11%		00%			03%								+49%		
	'98		03%		00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)													'92		740	Dec:		3%
													'98		1460			1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
S	92	22	-	-	-	-	-	6	-	-	28	-	-	-	560			28
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	92	83	-	-	18	-	-	-	-	-	101	-	-	-	2020			101
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	92	221	-	-	16	-	-	-	-	-	237	-	-	-	4740	-	-	237
	98	193	-	-	-	-	-	-	-	-	193	-	-	-	3860	5	7	193

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	-42%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	6760	Dec:		-
'98	3900			-

Opuntia spp.																		
S	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	5	12	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	-22%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	180	Dec:		-
'98	140			-

Pinus ponderosa																		
S	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	0	Dec:		-
'98	0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Prunus virginiana																		
S	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	92	5	8	-	1	-	-	-	-	-	14	-	-	-	280			14
	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	8	-	6	-	-	-	-	-	14	-	-	-	280	33	12	14
X	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	57%	00%	00%	+13%
'98	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	280	Dec:		-
'98	320			-

Purshia tridentata																		
S	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	92	5	1	-	1	-	-	-	-	-	7	-	-	-	140			7
	98	2	1	-	2	-	-	-	-	-	5	-	-	-	100			5
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	6	-	2	-	-	-	-	-	8	-	-	-	160	13	18	8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	14%	00%	00%	+46%
'98	54%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	140	Dec:		-
'98	260			-

Ribes cereum cereum																		
Y	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40	27	38	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	+50%
'98	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	20	Dec:		-
'98	40			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
S	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	92	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
	98	5	-	-	-	-	-	-	-	-	5	-	-	-	100	19	12	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	-58%
'98	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	240	Dec:		-
'98	100			-

Sambucus cerulea																		
S	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	1	-	-	-	-	-	-	-	2	-	-	-	40	37	29	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	00%	00%	00%	+ 0%
'98	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	40	Dec:		-
'98	40			-

Symphoricarpos oreophilus																		
S	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	92	8	8	2	-	-	-	-	-	-	18	-	-	-	360			18
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	92	-	7	1	-	-	-	-	-	-	8	-	-	-	160	-	-	8
	98	16	1	-	1	-	-	-	-	-	18	-	-	-	360	13	27	18

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'92	58%	12%	00%	-31%
'98	06%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'92	520	Dec:		-
'98	360			-

Trend Study 28-14-98

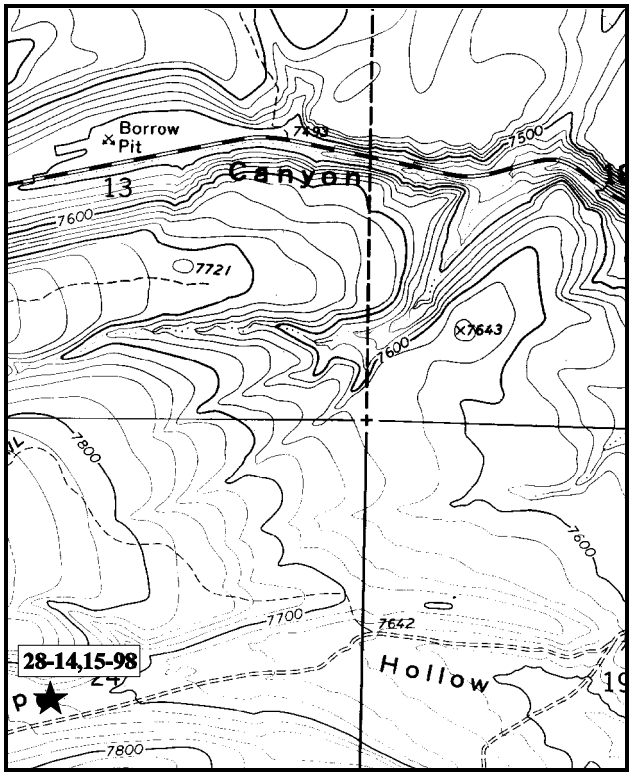
Study site name: Sheep Hollow West . Range type: Black Sagebrush .

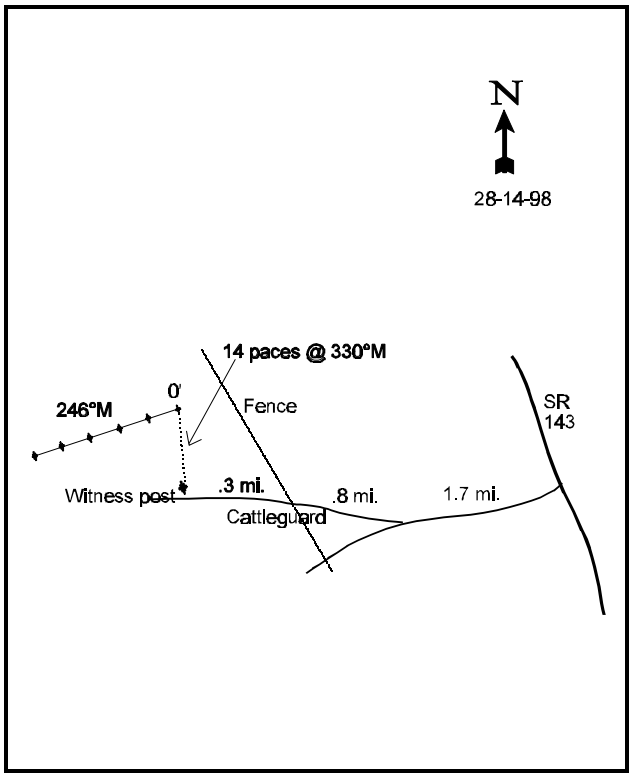
Compass bearing: frequency baseline 246 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Panguitch, head south on SR 143 to mile marker 47. Go 0.1 mile west of mile marker 47 and turn south onto a dirt road heading towards Sheep Hollow. Drive 1.7 miles to a fork. Stay right and continue 0.8 miles to a fence and cattleguard. Cross the cattleguard and go 0.3 miles to a witness post on the right side of the road. The 0-foot baseline stake is 14 paces from the witness post at 330° magnetic. The 0-foot stake has browse tag #500 attached.





Map Name: Panguitch Diagrammatic Sketch

Township 35S , Range 6W , Section 24 UTM 4179100.580 N, 369558.828 E

DISCUSSION

Study Site No. 28-14

This new site, Sheep Hollow West, was established in 1998 to monitor important winter range on the west side of the unit. Much of the winter range on this side of unit 28 is being affected by the encroachment of pinyon and juniper trees. An example of this is found in the Panguitch trend study site (# 28-2). Much of the important winter range on this side of the unit consists of black sagebrush ridges with bitterbrush and big sagebrush subspecies in the deeper soils of the drainage bottoms. Big game animals utilize these areas during most of the year and especially during the winter when deep snow pushes them to lower elevations. This site samples a wide drainage bottom which supports a dense population of black sagebrush with a good bitterbrush component. Slope is only 2% with a slight north aspect and an elevation of approximately 7,800 feet. The area is used by a variety of wildlife and livestock. Pellet group data from 1998 estimate 15 deer, 7 elk and 12 cow use days/acre. Some of these groups are old and likely from last winter. A few antelope pellet groups were also identified. Two dozen antelope were seen west of the site during study site establishment. Deer were also seen in the area. This area was historically a sheep range but use has been switched to cattle. The west side of the fence is permitted to be grazed by 296 AUM's from June to October, but has received little use during the past 3 years (1996-98). Cattle are currently utilizing the adjacent pasture to the east where trend study # 28-15 was placed.

Soil on the site is moderately deep with an effective rooting depth (see methods) of 15 inches. Texture is a clay loam with a slightly acid pH (6.3). Parent material is basalt. The soil profile is moderately rocky and rock and pavement cover approximately 13% of the ground surface. Bare soil has a relatively high cover value of 18%, yet erosion is minimal due to the relatively high vegetation and litter cover combined with the gentle terrain.

The site supports a dense stand of black sagebrush at an estimated density of 8,560 plants/acre. Mature plants are large, averaging 16 inches in height. Black sagebrush provides 64% of the browse cover with a cover value of 14%. There are some Wyoming big sagebrush plants on the site and there is some hybridizing between the two species. The black sagebrush shows mostly moderate to heavy use with good vigor, however it has a relatively high percent decadence of 39%. Currently, 15% of the population has died in the last 5-10 years. This period of thinning appears to have slowed down and stabilized for now. Within the next five years, the percent dead in the population would not be expected to exceed 17-18%. Recruitment is good and mature plants had abundant seed heads. Age class distribution would indicate a stable population. Bitterbrush also provides important forage as it provides 20% of the browse cover. Density is estimated at 540 mostly mature plants/acre. These plants show mostly moderate use, good vigor and low percent decadence at only 4%. Black sagebrush and bitterbrush together contribute 84% of the browse cover on this site.

Other browse encountered on the site consist of low rabbitbrush, stickyleaf low rabbitbrush, and isolated patches of Wyoming big sagebrush. Pinyon and juniper tree density was estimated at 10 to 15 trees/acre. These were hand cut here and around the surrounding area earlier this season as part of a tree thinning treatment. Only a few scattered young trees were left.

The herbaceous understory is diverse and abundant considering the high amount of shrub cover (22%). Grasses dominate the herbaceous cover by providing 77% of the herbaceous cover. Twelve species of perennial grass and one sedge were encountered in 1998. The most common species included mutton bluegrass and Letterman needlegrass which together produce 84% of the grass cover.

Forbs are also diverse with 18 perennial and 2 annual species found in 1998. Common species include: Indian paintbrush, Eaton fleabane, sulfur and redroot eriogonum, Lewis flax, and Utah deervetch. These species provide important succulent spring forage for big game animals.

1998 APPARENT TREND ASSESSMENT

Trend for soil appears stable with adequate protective ground cover to prevent erosion. Trend for browse appears stable with a relatively high turnover for black sagebrush. There is a high number of dead plants, but reproduction appears adequate to maintain the population at this time. Use is mostly moderate and vigor is good. Bitterbrush on the site also appear stable. Utilization is moderate to heavy, yet vigor is good on all plants and percent decadence is low at only 4%. The herbaceous understory is abundant and very diverse providing a total of 21% cover. Currently, mutton bluegrass and Letterman needlegrass dominate the grass component. Several preferred forbs occur and provide important spring forage for big game.

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 14

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron smithii	3	1	.00
G	Agropyron spicatum	6	2	.03
G	Agropyron trachycaulum	4	1	.03
G	Bouteloua gracilis	4	1	.03
G	Bromus inermis	5	1	.03
G	Carex spp.	21	7	.63
G	Koeleria cristata	27	10	.44
G	Oryzopsis hymenoides	2	1	.03
G	Poa fendleriana	232	69	8.61
G	Sitanion hystrix	74	33	.97
G	Stipa columbiana	8	3	.19
G	Stipa comata	12	6	.10
G	Stipa lettermani	183	72	4.86
Total Annual Grasses		0	0	0
Total Perennial Grasses		581	207	15.97
F	Antennaria rosea	16	5	.36
F	Arabis spp.	1	1	.01
F	Astragalus convallarius	8	5	.21
F	Astragalus spp.	3	1	.00
F	Castilleja linariaefolia	49	25	1.24
F	Erigeron eatonii	63	29	.59
F	Erigeron flagellaris	9	4	.07
F	Erigeron pumilus	25	8	.04
F	Eriogonum racemosum	55	29	.45
F	Eriogonum umbellatum	46	21	.79
F	Hymenoxys richardsonii	1	1	.03
F	Linum lewisii	46	19	.25

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
F	Lotus utahensis	35	15	.42
F	Lupinus kingii (a)	4	2	.03
F	Lychnis drummondii	7	3	.01
F	Machaeranthera canescens	5	3	.06
F	Penstemon caespitosus	3	1	.03
F	Penstemon spp.	3	1	.00
F	Phlox longifolia	58	24	.17
F	Polygonum douglasii (a)	11	4	.02
Total Annual Forbs		15	6	0.05
Total Perennial Forbs		433	195	4.79

BROWSE TRENDS --
Herd unit 28 , Study no: 14

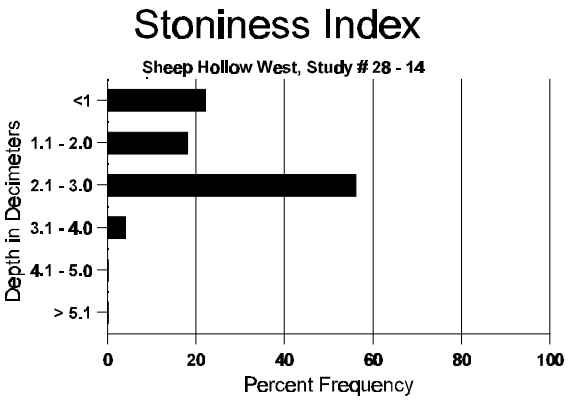
Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	95	13.73
B	Artemisia tridentata wyomingensis	2	-
B	Chrysothamnus depressus	10	.40
B	Chrysothamnus viscidiflorus viscidiflorus	54	2.79
B	Gutierrezia sarothrae	3	.21
B	Opuntia spp.	1	-
B	Purshia tridentata	23	4.41
Total for Browse		188	21.54

BASIC COVER --
Herd unit 28 , Study no: 14

Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	411	51.18
Rock	187	5.71
Pavement	239	6.77
Litter	474	39.84
Cryptogams	100	3.50
Bare Ground	314	18.07

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 14, Study Name: Sheep Hollow West

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.0	63.6 (16.0)	6.3	40.7	27.4	31.8	2.2	18.4	131.2	.3



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 14

Type	Quadrat Frequency '98
Rabbit	6
Elk	5
Deer	10
Cattle	1
Antelope	1

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 14

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	98	17	-	-	2	-	-	-	-	-	19	-	-	-	380			19
Y	98	10	9	-	10	-	-	-	-	-	29	-	-	-	580			29
M	98	86	96	44	2	-	-	4	-	-	232	-	-	-	4680	16	22	234
D	98	65	79	13	2	-	-	6	-	-	153	-	-	12	3300			165
X	98	3	2	-	-	-	-	-	-	-	3	-	-	-	1560			78

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'98	43%	13%	03%	

Total Plants/Acre (excluding Dead & Seedlings) '98 8560 Dec: 39%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	98	1	-	1	-	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing '98				Moderate Use 00%			Heavy Use 33%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		60	Dec:		-
Chrysothamnus depressus																		
S	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	98	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	98	10	-	-	-	-	-	-	-	-	9	-	-	-	200	7	10	10
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		240	Dec:		-
Chrysothamnus viscidiflorus viscidiflorus																		
Y	98	12	-	-	4	-	-	-	-	-	16	-	-	-	320			16
M	98	117	-	-	4	-	-	-	-	-	120	-	-	-	2420	8	12	121
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		2740	Dec:		-
Gutierrezia sarothrae																		
M	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80	6	8	4
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		80	Dec:		-
Opuntia spp.																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	12	1
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		20	Dec:		-
Purshia tridentata																		
Y	98	-	1	-	3	-	-	-	-	-	4	-	-	-	80			4
M	98	3	15	4	-	-	-	-	-	-	22	-	-	-	440	23	36	22
D	98	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing '98				Moderate Use 59%			Heavy Use 19%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		540	Dec:		4%

Trend Study 28-15-98

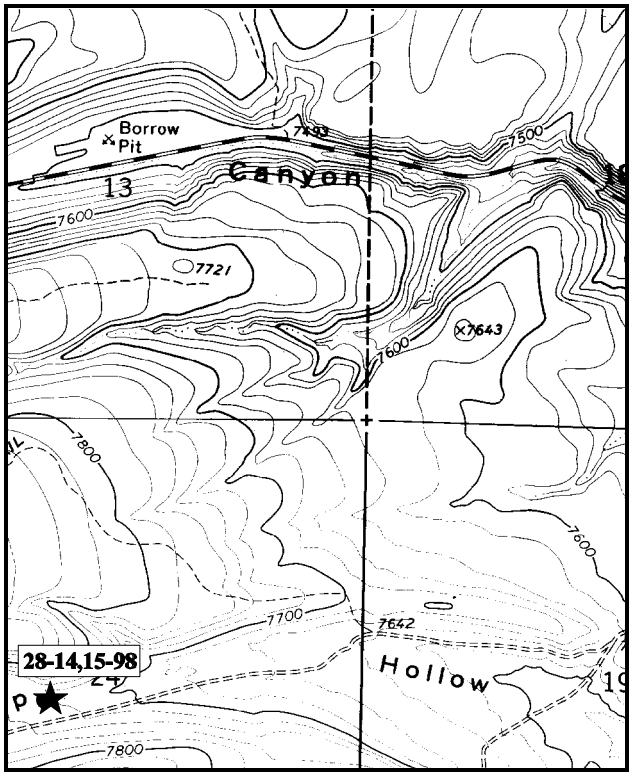
Study site name: Sheep Hollow East . Range type: Black Sagebrush .

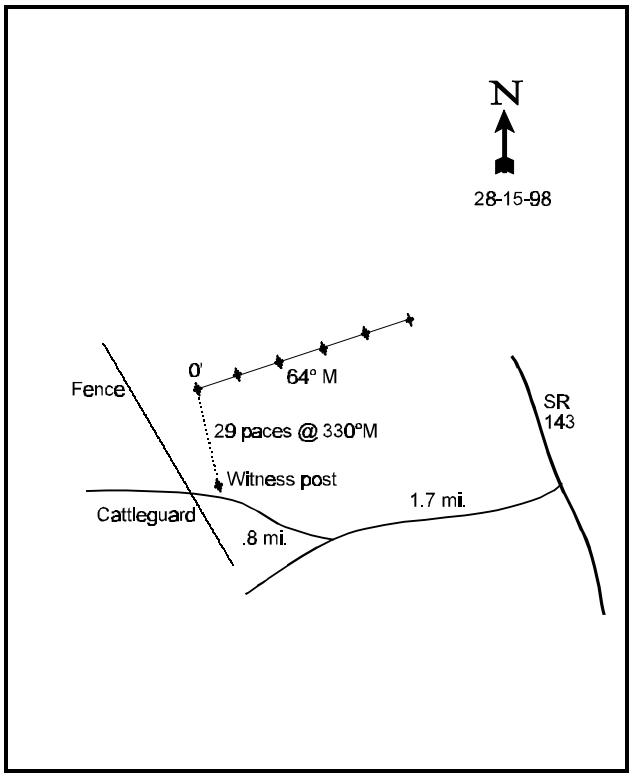
Compass bearing: frequency baseline 64 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Panguitch, head south on SR 143 to mile marker 47. Go 0.1 mile west of mile marker 47 and turn south onto a dirt road heading towards Sheep Hollow. Drive 1.7 miles to a fork. Stay right and continue 0.8 miles to a fence and cattleguard. The witness post is on the right side of the road just before the cattleguard. From the witness post, the 0-foot stake is 29 paces away at 330° magnetic and is marked with browse tag #496.





Map Name: Panguitch

Diagrammatic Sketch

Township 35S , Range 6W , Section 24

UTM 4179243.446 N, 370006.257 E

DISCUSSION

Trend Study No. 28-15

Sheep Hollow East, is a new site placed about ½ of a mile to the east of the Sheep Hollow West (#28-14) study. It is placed across a fence from #28-14, on a different pasture which receives heavier grazing pressure. The area was historically grazed by sheep until 1991 when use was changed to cattle. Wildlife also appear to be using this site more heavily than the #28-14 site. Pellet group data from 1998 estimate 27 deer, 15 elk and 22 antelope days use/acre. About 12 cows were utilizing the site during study site establishment. This pasture is permitted to be grazed by 800 AUM's with season long use from June to October. The cows are moved around the pasture by utilizing various water sources at different times of the year. A few antelope were seen near the site but most of the wildlife sign was old, likely from the previous winter. Slope on the site is slight (2%) with a slight east aspect. Elevation is about 7,800 feet. Escape and thermal cover are minimal on the site but some can be found about 300 yards from the site.

Ground cover characteristics are very similar to the Sheep Hollow West study site (#28-14). However, soil on this site is more shallow with more rock concentrated near the surface compared to the adjacent study. Effective rooting depth is estimated at almost 12 inches. Soil texture is a sandy loam with a neutral pH (7.1). The profile is very rocky in most places, especially at the beginning of the baseline. Parent material is a basalt. Erosion does not appear to be a serious problem on the site but some past erosion is evident in the form of severe soil pedestaling around bunch grasses and shrubs. Two gullies also border the site. It is also interesting to note that cryptogamic cover is very low on this site compared to the adjacent site were it has a 3 times higher cover value.

This site supports a similar mix of black sagebrush and bitterbrush with a grass-forb understory. Black sagebrush is the most abundant shrub providing 21% cover which accounts for 80% of the shrub cover. Estimated density is high at 7,840 plants/acre, 68% of which are mature. Mature plants are relatively large for black sagebrush, with an average height of 18 inches. Utilization is mostly light to moderate, although a few plants are heavily hedged. Vigor is good on most plants and percent decadence is lower at 28% than the neighboring site. Bitterbrush provides 16% of the browse cover with an estimated density of 600 plants/acre. These shrubs display moderate to heavy use, good vigor, and low decadence at only 3%.

The pinyon and juniper trees on this site were also hand cut this spring. Trees were scattered at only about 20 trees/acre. Currently, only a few small young trees are left. Other browse found on the site include a few basin big sagebrush which are growing on isolated areas of deep soil. Stickyleaf low rabbitbrush, broom snakeweed, Oregon grape, prickly pear, and gray horsebrush were also found on the site in small numbers.

The herbaceous understory is similarly diverse but not nearly as abundant compared to the Sheep Hollow West study site. Eleven species of perennial grasses, one annual grass and one sedge were encountered. These combined to produce only 8% cover. The only abundant species included in order of abundance: blue grama, bottlebrush squirreltail, Letterman needlegrass, and mutton bluegrass. Many of the preferred grass species were found growing under the protection of shrubs. Blue grama is found in the shrub interspaces, being a warm season species it would be less effected by livestock use than the cool season species. Twenty-three perennial and 3 annual forbs were classified on the site. Of these, only sulfur and redroot eriogonum, two fleabane species, hoary aster, and longleaf phlox are more than occasionally found.

1998 APPARENT TREND ASSESSMENT

The soil trend appears stable but erosion has occurred on this site in the past and the two gullies near the site appear to be occasionally active. Trend for key browse, black sagebrush and bitterbrush, appears stable but black sagebrush on this site has more decadent plants which were classified as dying than young plants to replace them. This may lead to a slight decline in shrub density in the future if reproduction does not

improve. This likely trend is clearly more correlated to the more shallow soils on this site causing more intraspecific competition during extended periods of drought. The herbaceous understory is similarly diverse as the adjacent site, but grass cover is one-half that of the Sheep Hollow West site and where a third of the of the grass cover comes from blue grama, a warm season increaser. The forb component is also similarly diverse but composition is lacking in preferred species. Preferred forbs, Indian paintbrush, Eaton fleabane, redroot eriogonum, sulfur eriogonum, Lewis flax, and Utah deervetch on this site has a sum of nested frequency value three and one-half times lower and provides one-fourth less cover than the adjacent Sheep Hollow West site.

HERBACEOUS TRENDS --
Herd unit 28 , Study no: 15

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
G	Agropyron intermedium	3	2	.01
G	Agropyron smithii	2	1	.01
G	Bouteloua gracilis	175	61	2.76
G	Bromus carinatus	23	9	.12
G	Bromus tectorum (a)	7	4	.02
G	Carex spp.	3	2	.06
G	Koeleria cristata	3	1	.03
G	Oryzopsis hymenoides	4	2	.18
G	Poa fendleriana	40	15	.76
G	Sitanion hystrix	116	42	1.57
G	Stipa columbiana	9	4	.21
G	Stipa comata	16	8	.38
G	Stipa lettermani	62	24	1.63
Total Annual Grasses		7	4	0.02
Total Perennial Grasses		456	171	7.76
F	Alyssum alyssoides (a)	6	2	.01
F	Arabis spp.	11	5	.05
F	Astragalus convallarius	11	5	.22
F	Astragalus spp.	9	3	.02
F	Castilleja linariaefolia	17	8	.16
F	Chaenactis douglasii	7	4	.02
F	Cryptantha spp.	6	3	.04
F	Descurainia spp. (a)	2	2	.01
F	Erigeron divergens	20	10	.15
F	Erigeron eatonii	7	3	.01
F	Erigeron flagellaris	8	2	.38
F	Erigeron pumilus	25	12	.11
F	Eriogonum racemosum	23	12	.21

Type	Species	Nested Frequency '98	Quadrat Frequency '98	Average Cover % '98
F	Eriogonum umbellatum	31	18	.49
F	Euphorbia robusta	5	2	.09
F	Gilia spp. (a)	4	3	.01
F	Linum lewisii	9	5	.05
F	Lotus utahensis	4	2	.06
F	Lupinus argenteus	12	5	.25
F	Lychnis drummondii	1	1	.00
F	Lygodesmia spinosa	23	10	.18
F	Machaeranthera canescens	28	15	.15
F	Oenothera pallida	17	6	.08
F	Phlox longifolia	23	11	.08
F	Senecio multilobatus	1	1	.03
F	Trifolium spp.	2	1	.00
Total Annual Forbs		12	7	0.03
Total Perennial Forbs		300	144	2.89

BROWSE TRENDS --
Herd unit 28 , Study no: 15

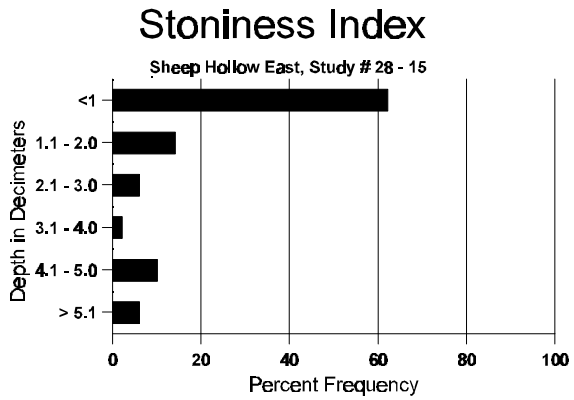
Type	Species	Strip Frequency '98	Average Cover % '98
B	Artemisia nova	96	20.73
B	Artemisia tridentata tridentata	9	.77
B	Ceanothus fendleri	1	-
B	Chrysothamnus nauseosus	0	-
B	Chrysothamnus viscidiflorus viscidiflorus	9	.24
B	Gutierrezia sarothrae	1	.03
B	Mahonia repens	9	.01
B	Opuntia spp.	3	-
B	Pinus edulis	1	.03
B	Purshia tridentata	23	4.14
B	Tetradymia canescens	1	-
Total for Browse		153	25.96

BASIC COVER --
Herd unit 28 , Study no: 15

Cover Type	Nested Frequency '98	Average Cover % '98
Vegetation	379	44.70
Rock	136	5.99
Pavement	222	6.91
Litter	493	45.79
Cryptogams	22	.04
Bare Ground	277	16.03

SOIL ANALYSIS DATA --
Herd Unit 28, Study # 15, Study Name: Sheep Hollow East

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.5	64.4 (11.6)	7.1	62.7	21.4	15.8	2.6	24.8	262.4	.3



PELLET GROUP FREQUENCY --
Herd unit 28 , Study no: 15

Type	Quadrat Frequency '98
Rabbit	3
Elk	5
Deer	26
Cattle	6
Antelope	1

BROWSE CHARACTERISTICS --
Herd unit 28 , Study no: 15

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	98	10	1	-	-	-	-	-	-	-	11	-	-	-	220			11
Y	98	9	5	-	2	-	-	-	-	-	15	1	-	-	320			16
M	98	147	94	25	-	-	-	-	-	-	259	7	-	-	5320	18	28	266
D	98	69	35	2	-	2	-	-	-	-	90	-	-	18	2200			110
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	1180			59
% Plants Showing '98				Moderate Use 35%			Heavy Use 07%				Poor Vigor 05%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		7840	Dec:		28%
Artemisia tridentata tridentata																		
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	98	6	3	-	-	-	-	-	-	-	7	-	-	-	180	40	48	9
D	98	2	1	-	-	-	-	-	-	-	3	-	-	-	60			3
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
% Plants Showing '98				Moderate Use 31%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		260	Dec:		23%
Ceanothus fendleri																		
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		20	Dec:		-
Chrysothamnus nauseosus																		
M	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	24	0
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		0	Dec:		-
Chrysothamnus viscidiflorus viscidiflorus																		
Y	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	98	10	1	-	-	-	-	-	-	-	11	-	-	-	220	8	15	11
D	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
% Plants Showing '98				Moderate Use 08%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		260	Dec:		8%
Gutierrezia sarothrae																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	18	1
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%				Poor Vigor 00%					%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		20	Dec:		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
Y	98	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	98	32	-	-	8	-	-	-	-	-	40	-	-	-	800	-	-	40
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%			Poor Vigor 00%						%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		880	Dec:		-
Opuntia spp.																		
M	98	2	-	-	1	-	-	-	-	-	3	-	-	-	60	8	6	3
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%			Poor Vigor 00%						%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		60	Dec:		-
Pinus edulis																		
Y	98	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%			Poor Vigor 00%						%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		20	Dec:		-
Purshia tridentata																		
Y	98	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
M	98	2	15	10	-	-	-	-	-	-	27	-	-	-	540	31	50	27
D	98	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
X	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing '98				Moderate Use 53%			Heavy Use 33%			Poor Vigor 00%						%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		600	Dec:		3%
Tetradymia canescens																		
M	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	18	1
% Plants Showing '98				Moderate Use 00%			Heavy Use 00%			Poor Vigor 00%						%Change		
Total Plants/Acre (excluding Dead & Seedlings)													'98		20	Dec:		-

SUMMARY

WILDLIFE MANAGEMENT UNIT - 28 (47) - PANGUITCH LAKE

The severe deer winter range on this unit is restricted to the western portion of the herd unit below the Hurricane Cliffs. Five vegetation trend studies occur on this range including Swayback Knoll (#5), Cottonwood (#6), Paragonah (#7), Grass Valley (#8), and Elliker Basin (#11). Four of the five pellet group transects on this range reveal a gradual decrease in use since 1987, when buck harvests reached there highest levels since the early 1970's. However, the Elliker Basin pellet group transect has increased steadily since 1987, when 118 deer days use/ha were estimated. During the winter of 1991-1992, 178 deer days use/ha were estimated. Browse trend for the Elliker basin vegetation transect is down due to increased decadency and poor sagebrush recruitment. Heavy browsing does not seem to be the cause for this downward trend because the proportion of heavy utilized shrubs went down from 30% in 1987 to 16% in 1992. Browse trends are slightly down or down on all sites. Soil trends are stable to slightly improved on all sites. However, the herbaceous trends were stable to slightly up on sites 7, 8, and 11, the remaining two sites downward trends.

Two study sites sample normal winter range on the east side of the unit. These include Three Creeks (#1), an old chained area, and Panguitch (#2) a pinyon-juniper site south of Panguitch. The Three Creeks and Panguitch site has stable trends for browse, grasses, and soil.

The transition range study sites sample the Upper Bear Valley (#3) and Buckskin Valley (#4) areas. The seeded range in Bear Valley had been grazed recently before the 1992 reading. The soil trend is slightly down. The browse trend is slightly down as well, due to decreased sagebrush densities and increases in less desirable rabbitbrush. The herbaceous trend is up, especially for grasses. The Buckskin Valley site is located near a pellet group transect which shows the highest five-year average ddu/ha (146) for the unit during the 1987-92 period. The soil trend is slightly up and the herbaceous trend is down. Browse trend is slightly down for mountain big sagebrush, even though densities actually went up slightly. Since 1987, the proportion of heavily hedged sagebrush rose from 20% to 32%, while percent decadency increased from 36% to 56%. Vigor has also declined. Bitterbrush, another important browse on the site, nearly doubled in density but is still being heavily utilized. Overall browse trend on this site is slightly down.

Two summer range sites were reread during the 1992 reading, Little Valleys (#9) and Red Desert (#10). A new summer range study site was established on a burned Ponderosa pine\sagebrush area at Asay Knoll (#13). The aspen transects of Little Valleys and Red Desert display stable soil trends and stable to slightly improving herbaceous trends. Browse trends are up for Little Valleys and stable to slightly up for Red Desert. Apparent trends for Asay Knoll included a stable soil and herbaceous understory trend with an improving browse trend.

Herd Unit Management Strategies

The management objective for the summer range sites in Little Valleys and the Red Desert should be to maintain aspen as the dominant cover type. The site above Little Valleys samples a grove of aspen that has a fair amount of regeneration evident in the understory. This is not necessarily the case with adjacent stands which vary as to the extent of regeneration and conifer invasion. The Red Desert site is in a later stage of succession, with subalpine fir and Engelmann spruce comprising 54% of the browse/tree composition. The understory in both sites is rated as providing good ground cover and a good mixture of herbaceous species.

Given the high percentage of private ownership (41%) of the severe winter deer range, special consideration should be given to acquisition of available parcels in key areas and management of optimum habitat conditions on public lands (federal and state). Where pinyon and juniper are becoming reestablished on chained areas, maintenance projects should be designed and carried out to maintain the productivity of browse species.

	1992			1998		
Site	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & Forbs
28-01 Three Creeks	0	+	+	0	0	0
28-02 Panguitch	-	-	-	0	0	0
28-03 Bear Valley	-	-	0	+	0	0
28-04 Buckskin Valley	0	-	+	+	-	-
28-05 Swayback Knoll	-	0	+	+	-	-
28-06 Cottonwood	0/-	0	0	+	-	-
28-07 Paragonah	-	0	-	+	-	0
28-08 Grass Valley	0	-	0	+	-	+
28-09 Little Valley	0	+	0	0	0	-
28-10 Red Desert	0	0/+	+	0	0	-
28-11 Elliker Basin	0	-	0	0	-	0
28-13 Asay Knoll	ESTABLISHED IN 1992			0	0	+
28-14 Sheep Hollow West	ESTABLISHED IN 1998			ESTABLISHED IN 1998		
28-15 Sheep Hollow East	ESTABLISHED IN 1998			ESTABLISHED IN 1998		

(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward, (0/+) = stable to slightly upward